Coal Age

JANUARY 1954

A McGRAW-HILL PUBLICATION—PRICE 50c

New Mining Ideas

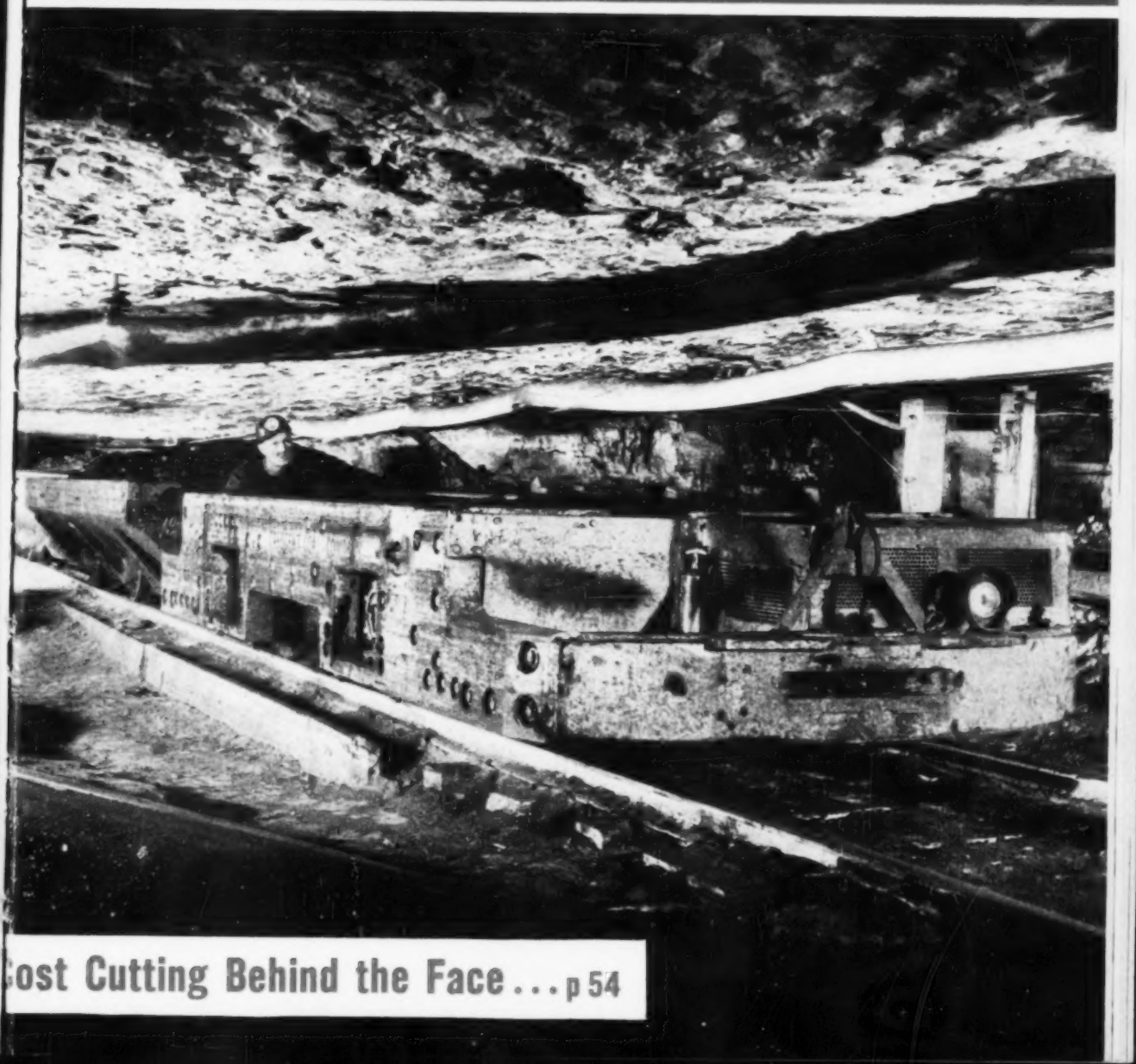
How a remotely controlled continuous unit mines 350 ft beyond highwall. p 64

Push-button measuring and loading for trucks. p 68

Continuous-type head on a loader gets 47 tpm. p 76

Late-type auger (p 78) and new 8-yd drag (p 82) extend mining limits for two firms.

Full Contents on P 5



ost Cutting Behind the Face . . . p 54

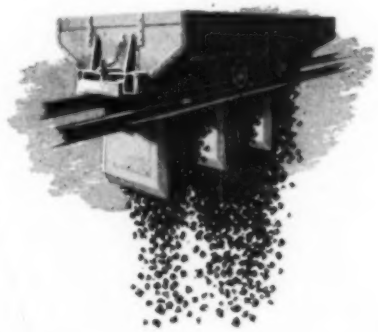
NO IDLE WAITING

A few minutes or hours of 'idle time' anywhere along the line (at the face, at the dumping point, or at the processing plant) can quickly drain away profits for weeks or months ahead.

That's one of the reasons why so many mine operators prefer A. C. F. Mine Cars. They know that a mine car can be repaired while the trip continues... production keeps rolling.

And, furthermore, they know that mine cars are the most economical and safest 'single-line' transportation system that hauls coal out, men and supplies into the mine.

Your A. C. F. Representative will be glad to give you the facts on how A. C. F. Mine Cars are the cheapest, most dependable transportation system for your mine. American Car and Foundry Company, New York • Chicago St. Louis • Cleveland • Philadelphia • Huntington, W. Virginia • San Francisco • Washington Berwick, Pa.



a.c.f. MINE CARS

for Constant Haulage

Coal Age

JANUARY • 1954

Editorials: Hold the Gains; Good Business; Milestone 53

Cost Cutting Behind the Face—SPECIAL REPORT. 54

Remotely Controlled Miner Works 350 Ft. 64

Push-Button Truck Loading. 68

Drive Design Improves Slope Belt—R. R. RICHART. 70

47 Tons Per Man-Shift. 76

Auger Extends Mining Horizon. 78

Belt Splicing Under Pressure. 81

Raising Strip-Mine Life. 82

Foremen's Forum: Pressure and Resistance. 88

No Room for Industrial Complacency. 92

Operating Ideas: Versatile Mine-Built Fire Truck. . . . 94

Adjustable Armature Stands From Standard Parts 94

How to Cut Trolley-Line Costs. 96

Rope Installation on Car Spotter Simplified. . . . 98

Rack Provides Storage for Mine Supplies. 98

Equipment News and Bulletins 100 *News Round-Up* 111

How Does 1954 Look?

Combining both special staff-written reports and up-to-the-minute statistics compiled by USBM experts, *Coal Age's* Annual Review and Forecast section in the February issue will give you the first available, comprehensive over-all analysis of coal's progress and development in 1953, together with an authoritative look at the industry's 1954 prospects. In this roundup of the 1953-54 picture, *Coal Age* will cover such topics as:

Competition and markets.

Labor and public relations.

Tonnage records and forecast.

New and important developments in mining and preparation.

Trends in loader and cleaner sales.

Safety progress and outlook.

In addition, of course, February *Coal Age* will present its usual fare of reports on significant developments in deep mining, stripping and preparation such as:

How conveyor haulage can be successfully used with continuous mining for better operation and increased output per man.

Concentrated working areas, section belts and track haulage team up for efficient continuous coal loading at Dawson Daylight's newest mine, producing 2,000 tons of cleaned coal per day.

Why parallel operation of units converting AC to DC is an advantage in mine operation and what you need to know to do it effectively, by an expert in the field.

Three fundamentals of high-productivity stripping, as practiced by the A. E. Dick Contracting Co. in stripping a 30-ft anthracite seam under 170 ft of cover.

ALFRED M. STAEHLE, Publisher IVAN A. GIVEN, Editor

W. H McNEAL, Managing Editor
J. H. Edwards, Associate Editor
W. A. Stanbury Jr., Associate Editor
Harold Davis, Associate Editor
A. E. Flowers, Associate Editor
F. A. Zimmerli, Assistant Editor (layout)

G. B. Bryant, Jr., Washington

CARL COASH, Advertising Sales Manager

COAL AGE JANUARY, 1954

VOLUME 59 NUMBER 1

(with which are combined The Colliery Engineer and Mines and Minerals)

Published monthly on the 1st by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder. Member ABC and ABP. **Publication Office:** 1309 Noble St., Philadelphia 23, Pa.

Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. Donald C. McGraw, President; Willard T. Chevalier, Executive Vice President; Joseph A. Gerardi, Vice President and Treasurer; John J. Cook, Secretary; Paul Montgomery, Senior Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Nelson Bond, Vice President and Director of Advertising; J. E. Blackburn, Jr., Vice President and Director of Circulation.

Subscription: Address all correspondence to COAL AGE—Subscription Service, 1309 Noble St., Philadelphia 23, Pa., or 330 W. 42nd St., New York 36, N. Y.

A McGRAW-HILL PUBLICATION

Member of Associated Business Publications and Audit Bureau of Circulations

Allow 1 month for change of address. Subscriptions are solicited only from management, production and maintenance executives and engineers in the coal-mining industry. Position and company connections must be indicated on subscription orders.

Single Copies U.S. and possessions and Canada, 50c; all other countries $1.50.

Subscription rates: United States and possessions, $5 for one year, $8 for two years, $10 for three years. Canada, $6 for one year, $10 for two years, $12 for three years. Other Countries in the Western Hemisphere, $10 for one year, $16 for two years, $20 for three years. All other countries, $15 for one year, $25 for two years, $30 for three years.

Entered as second class matter May 4, 1951, at the Post Office, Philadelphia, Pa., under the Act of March 3, 1879. Printed in U.S.A. Contents Copyright 1954 by McGraw-Hill Publishing Co., Inc.—All rights reserved. COAL AGE articles are indexed regularly by Engineering Index, Inc. COAL AGE's own index is published annually in December.

Branch Offices and District Managers: Atlanta 3, R. H. Sidur; Chicago 11, F. W. Roets and G. A. Mack; Cleveland 15, W. M. Spears; Dallas 1, J. H. Cash; Los Angeles 17, G. W. Dysinger; New York 36, T. E. Alcorn and J. B. Lewis (New York and New England); Philadelphia 3, W. A. Potter; Pittsburgh 22, H. C. Chellson; St. Louis 1, F. W. Roets; San Francisco 4, J. W. Otterson; Boston, 16; Washington 4; McGraw-Hill House, 95 Farrington St., London E. C. 4.

News Bureau Offices: Atlanta 3; Cleveland 15; Detroit 26; Houston 25; San Francisco 4; Washington 4.

World News Offices: London, Paris, Frankford, Tokyo, Manila, Rio de Janeiro, Mexico City.

BEARINGS BEAR UP BETTER

WITH TEXACO REGAL STARFAK

grease, bearings bear up in service and you can bear down on maintenance costs. Use it for grease-lubricated anti-friction bearings of locomotives, cutters, loaders and similar equipment.

Ordinary greases can't compare with premium quality *Texaco Regal Starfak* for stability and oxidation-resistance. Whether in service or storage, *Texaco Regal Starfak* won't separate. It clings to bearings, assuring longer life—maximum protection against rust—lower maintenance costs.

To safeguard wire rope and open gears, the lubricant to use is *Texaco Crater*. It adds life to

TUNE IN:
METROPOLITAN OPERA
radio broadcasts
every Saturday afternoon.
See newspaper for
time and station.

TEXACO

TEXACO

PAGES
MISSIN
ARE
AV

NG
E NOT
VAILABLE

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

JANUARY, 1954

IVAN A. GIVEN, EDITOR

Hold the Gains

NEW MACHINES and modern methods are steadily pushing up production per man at the face to 30, 40 and 50 tons or more. Late data on 58 continuous miners in 22 mines throughout the country, for example, show an average output of 28.2 tons per man-shift. In coal under 4½ ft, 33 machines are presently averaging 27.9 tons; in coal over 4½ ft, 25 machines are averaging 28.5 tons. Many of the higher figures are being reached in the thinner seams: for example, 47 tons in 42 in, and 50 tons in 48 to 56 in.

It is over-all tons per man for the mine that count in the end, however. Therefore, unless service functions match the efficiency of face operations, hard-earned gains at the face are needlessly sacrificed on the trip to the railroad car. What can be done to prevent this sacrifice is the subject of "Cost Cutting Behind the Face," the sixth in the *Coal Age* cost-cutting reports beginning on the following page of this issue.

As at the face, machines are the big answer—either to eliminate hand work or, as with big locomotives, to reduce manpower for a specific operation. Materials and methods also enter the picture: for example, really permanent haulway timbering to cut maintenance and replacement labor to a minimum, and gravity water handling and one-way air travel to save power. As more of the operations behind the face are brought to peak efficiency, more of the face gains are preserved and thus are translated into today's vital factor—lower cost.

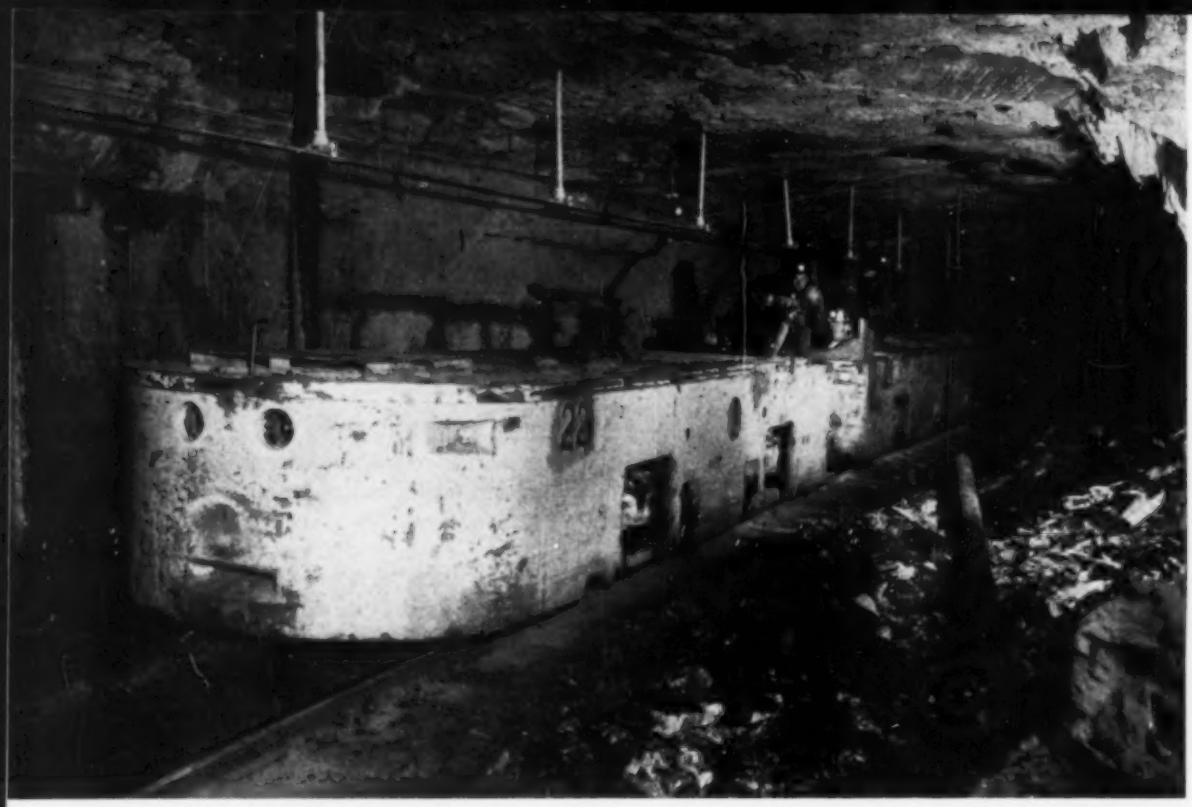
Good Business

A PROFIT is what keeps the commercial coal operator in business—and the commercial operator is the main if not the only source of coal fuel for a wide range of consumers from the electric-utility industry on down. Low cost is a major ingredient in profit—and is the operator's responsibilty—but profit also is contingent on price per ton and total tons sold, which in turn involves the assumption of some responsibilty by the buyer of coal. The buyer has the right to demand efficiency at the mines because it cuts his cost, but beyond that common prudence dictates that he accept the fact that a stable, permanent source of supply is essential to stability and economy in his own operations.

When inability to make a profit dries up or sharply curtails a source of supply, the buyer is more at the mercy of the remaining suppliers and is less able to protect himself against interruptions. The same general reasoning applies to maintenance of an outside source of supply by companies with their own producing facilities. In other words, good business amply justifies the buyer of substantial quantities of any product in seeing to it that his source is maintained in a healthy conditon by a reasonable volume of orders and prices that will permit the efficient producers to make a reasonable profit. At the same time, incidentally, the buyer guarantees himself a better market for the things he produces.

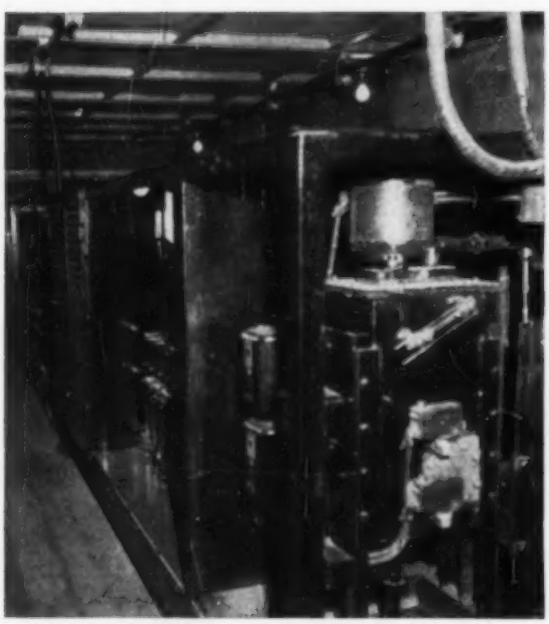
Milestone

NOVEMBER 12, 1953, might well be a milestone in the progress of the bituminous coal industry. On that date, the board of directors of Automatic Solid Fuels Equipment, Inc., held its first meeting to launch the industry's first venture into the manufacture and marketing of domestic coal-burning equipment. This latest in a heartening series of developments indicating that both anthracite and bituminous believe that business can be gotten if the fight is made also reflects the growing realization that merchandising in all its aspects will be a vital factor in future progress. The opportunities for making merchandising effort effective are being broadened almost daily. It need hardly be said that the more the participation in these and other programs to come, the greater the results in more business and a better profit.



MODERN HAULAGE EQUIPMENT operating over modern haulways promotes efficiency at the face while cutting haulage cost itself. This new tandem locomotive operating through a new haulway was one factor in a modernization program which included better service to working sections and raised output 90 tons per machine-shift at one mine in the first month after completion of the program (CA—Nov., 1951, p 76).

Low-Cost Services—Better Face Results



RATED VOLTAGE at the machine terminals promotes face efficiency. Substation capacity, minimum distance and ample copper do the trick (CA—May, 1953, p 100).

EFFICIENT WATER HANDLING involves keeping water out, handling by gravity and pumping efficiently, as at this three-unit flexible station (CA—Feb., 1953, p 114).

LOW-COST VENTILATION reflects good coursing, low resistance, elimination of leakage and the use of modern fans, such as this adjustable one (CA—Feb., 1950, p 106).

AMPLE BUT NOT EXCESSIVE supplies where needed and when needed support face operations while efficient supply handling, including power equipment, keep cost down.

Cutting Cost Behind the Face

How to achieve efficiency and support face operations through better haulage, power, drainage, ventilation and handling of men and materials.

SINCE THE REAL GOAL in deep-mining operations is to keep loading going at the face at the top rate at as nearly full time as possible, operations behind the face should be set up with that as the guiding principle. At the same time, care should be taken to make these face-supporting operations themselves as efficient as possible.

If modern locomotives and modern methods, for example, can make it possible for two men to deliver 2,000 tons to the dump per shift, against 6 or 8 men with older lower-capacity facilities, the saving of $75 to $110 per shift warrants a substantial investment. Savings of this magnitude ($15,000 to $25,000 or more per year) have been achieved at a significant number of mines through this step alone, not to mention the additional and even more-important savings resulting from fewer interruptions and greater production per face unit.

The face-supporting operations at deep mines include the following:

1. **Haulage and hoisting**—perhaps the most important because deficiencies in this department are directly reflected in lowered production at the face.
2. **Power.**
3. **Handling Water.**
4. **Ventilation.**
5. **Handling men and materials.**
6. **Maintenance** (see "Cost Cutting at the Face, *Coal Age*, November, 1953, p 70).

APPROACH THE KEY

As in all other activities directed toward cutting cost, promoting safety and raising quality and efficiency, cost cutting behind the face involves first of all a determination to see that it is done to the maximum extent possible. This determination must pervade all ranks of management from the bottom up and the top down. The next step is to study the operation, thoroughly and in detail. Only thus can the data for progress be obtained. Next is to consider the possible equipment and methods that may be employed to improve the operation and forecast the possible results. Next is to make the necessary investments or adopt the methods that study has indicated will achieve the desired results.

Brain sweat and money therefore become the basic ingredients. Neither is more—or less—important than the other. The goals are really worth trying for—for example, increases of 10 to 25% or more in face performance have been obtained by making main-line haulage more efficient; elimination of waste, machine abuse and the like have reduced supply costs 10, 20 or more cents per ton; and ventilation costs have been cut a third or more by new fans, better airways and reduction in leakage. What experience has shown to be the major directions in cutting cost behind the face is summarized in the following material.

LONG LIFE WITH MINIMUM TROUBLE and maintenance were the goals in roof support, rail welding and other modern construction of this haulageroad (CA—May, 1953, p 114).

CONTROL AND SCHEDULING promote haulage and mine efficiency. Here, FM phones operating over trolley wires provide excellent communication (CA—Nov., 1953, p 96).

For Efficient, Economical Haulage

MANLESS TRANSFER is achieved by the equipment shown here, plus electrical inching controls (CA—August, 1953, p 99). Modern facilities also save production time.

BELT APPLICATIONS include hoisting which, in this instance cut hoisting labor from nine men to two, at the same time upping mine capacity one-third (CA—Sept., 1952, p 76).

Haulage for Low Cost

Whether mine cars or belts are employed, the primary goal in mine transportation, including hoisting, is keeping the face units, as previously pointed out, working at capacity as near full time as possible. Next, the transportation system itself should be designed for operation with a minimum number of men, which is the high road to lower cost in haulage itself. Capacity therefore becomes the first consideration. Second is continuity of operation, meaning not necessarily actual continuous operation but elimination of delays and interruptions affecting face operation. Third is use of minimum manpower.

CAPACITY KEYS

Capacity in a transportation system is primarily a reflection of size of units and speed of operation, plus control or scheduling to achieve the maximum in continuity. A number of small units operated at slow speed can provide capacity but the scheduling problem is more difficult and the possibility of interruptions and interference is increased. Equally important, the manpower requirements rise in proportion, with substantial adverse effect on cost.

High speed with small units is of course one way of achieving capacity, with perhaps the possibility of reducing the investment in equipment. But speed normally requires horsepower and increasing the horsepower increases the size of, say, a locomotive. Therefore, the possibilities in this direction are self-limiting. In addition, higher speeds increase the hazards—for example, wrecks and derailments in mine-car haulage. With belts, increasing the speed, among other things, increases the impact when coal is fed onto the belt at a lower rate, with consequent damage to both cover and carcass.

Thus, though full advantage should be taken of speed, perhaps the emphasis should be laid on size of mine car, weight of locomotive and width of belt first, with speed of operation second. And when speed is to be stepped up in mine-car haulage—and, in fact, for efficiency at any time—track must be built accordingly.

CAPACITY AT LOW COST

Taking into consideration both investment and operating costs, ways of attaining capacity in mine-car haulage and the advantages they provide include the following:

Big Cars and Locomotives—The major advantage of such equipment is a reduction in manpower requirements for a given tonnage. Modern locomotives are now available in single units of up to 50 tons. This 50-ton mark was reached in the latter part of 1953 at a mine in western Pennsylvania. Where height and clearance prevent single units in the larger sizes, modern locomotives are available in tandem and even triple units for added capacity with no increase in crew size. Modern design includes safe riding facilities for motorman and triprider, and provisions for easier maintenance. Modern units, among other things, can be supplied with dynamic braking in addition to air or hydraulic facilities. They also can provide an appreciable increase in speed with equal or greater smoothness and safety.

Modern mine cars with capacities up to 10 tons or more are widely used underground today, with good prospects that the size will go to 20 tons or more for mainline service with mother belts in the near future if not already. Lightness with strength and resistance to corrosion, abrasion or both are achieved by better design and lightweight high-strength steels and aluminum. Operation is eased, maintenance is reduced and safety is promoted by steel or improved cast-iron wheels, antifriction bearings, automatic couplers and, even, in some instances, hydraulic brakes. Special types, such as the overlapping car, are designed to facilitate automatic loading entrain.

Modern Haulage Roads—Good track alone, without any other changes in facilities, can increase the capacity of a haulage system up to 10 to 20% or more by eliminating wrecks and slowing down to prevent them. Even before that, however, attention to certain fundamentals will promote haulage effieiency. These include:

1. Shortest Possible Haul. Frequently, the logical system of development provides the shortest haul but in irregular coal areas or in old mines it may be possible to achieve handsome savings by constructing new shortcuts, even through old works, if the distance can be reduced substantially; by building bridges to establish new short routes from area to area in hilltop mining; and by relocating portals, with or without construction of outside haulaways to supplement those underground.

2. Grade Reduction. One hump only a few hundred feet long in a haulway often can force a reduction in trip size sufficient to require the use of one or more additional locomotives or crews.

Accepted principles in track construction for safe, smooth and efficient haulage include the following:

1. Good Drainage. Ditches are the low-cost automatic answer. Where extensive ditching is impractical, some operators have found that it pays to go as far as short ditches and sumps equipped with automatic pumps to keep roadbeds dry.

2. Good Subgrade. This involves proper grading and preparation and the use of materials that will not disintegrate and will drain well if water is present.

3. Good Ties and Ballast.

4. Heavy Rail and Long-Radius Curves. In addition to these, good track includes superelevation as necessary. Welded joints are widely used to provide a continuous running surface and power return, and to reduce joint maintenance.

5. Good Roof Support and Clearance. Good support can be achieved by standard timbering but the trend is to roof-bolting, hitch timbering, sand-cement lining and the like for permanency with elimination of legs and additional clearance. Good support that is really permanent naturally cuts maintenance material and labor to a minimum.

What does observance of these principles provide in actual practice? Examples from the pages of *Coal Age* include the following:

1. Modernization of an old haulway 21,000 ft long for use by a new 24-ton locomotive, installation of a new 48-ton tandem locomotive on a new extension with a grade of nearly 3% against the loads, and special provisions for cutting trip-changing time at shuttle-car loading stations resulted in an increase of 90 tons per machine shift in the first month after the modernization program was completed (*Coal Age*, November, 1951, p. 76).

2. Reconstruction of the haulage road, installation of 9-ton cars, and replacement of old haulage units with a 45-ton three-unit machine operating at 12 mph resulted in the new three-unit locomotive replacing four and sometimes five old locomotives. The new unit, with two men, delivers 4,500 tons to the slope bottom per shift, hauling 4 to 4½ mi, compared to 8 to 10 men to deliver 3,400 to 3,500 tons under the old system (*Coal Age*, September, 1952, p 76).

CONSTRUCTION AIDS

Construction, rebuilding and maintenance of haulage roads and auxiliary facilities now can be mechanized to a considerable degree with consequent saving in manpower and cost. In addition to such equipment as air compressors, air drills, air tampers and air spike drivers, special equipment includes such items as the following:

1. A ballast-spreading car with bottom opening gate that can be fixed to spread the required quantity of ballast as the car is pushed along by a locomotive (*Coal Age*, October, 1953, p 116).

2. A new hand-hydraulic hoist mounted on the end of a flat-bed timber car for installing heavy crossbars in haulage entries, cutting manpower requirements as much as one-half to two-thirds (*Coal Age*, May, 1953, p 106).

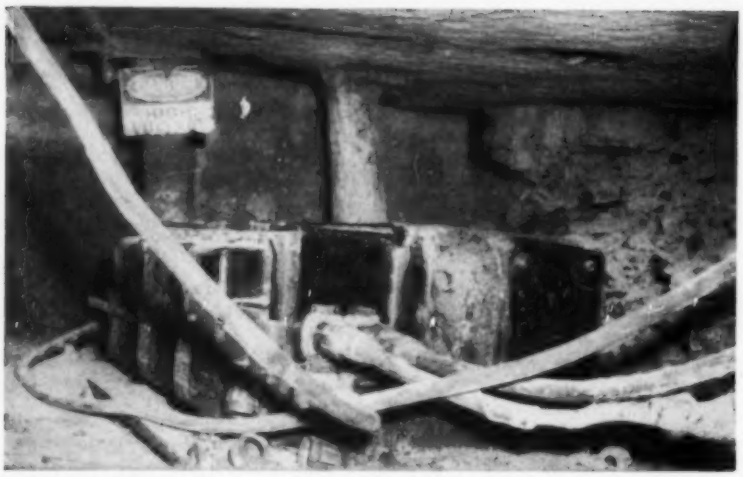
CONTROL FOR EFFICIENCY

Where modernization of haulage reduces the number of units operating over the mainline to one, as in a preceding example, it is logical that the problem of scheduling trips and controlling equipment movement should be reduced. But even with only one unit on the mainline, a number of relay or gathering units must be handled, or coal must be pulled from a number of conveyor stations. Therefore, for maximum efficiency and elimination of lost time for the production units, scheduling is a must in most operations. The dispatcher therefore becomes a key figure. Not only is he essential for control of haulage operations and equipment movement, he can keep track of officials, dispatch crews to trouble spots promptly and generally keep operations running smoothly by knowing what goes on everywhere all the time.

To help the dispatcher and generally promote the smooth, efficient operation of the mine, the following are widely employed: block signals, telephone and radio systems; automatic switchthrowers, derails and doors (which also reduce manpower requirements), adequate sidetrack facilities, properly located passing points, and so on.

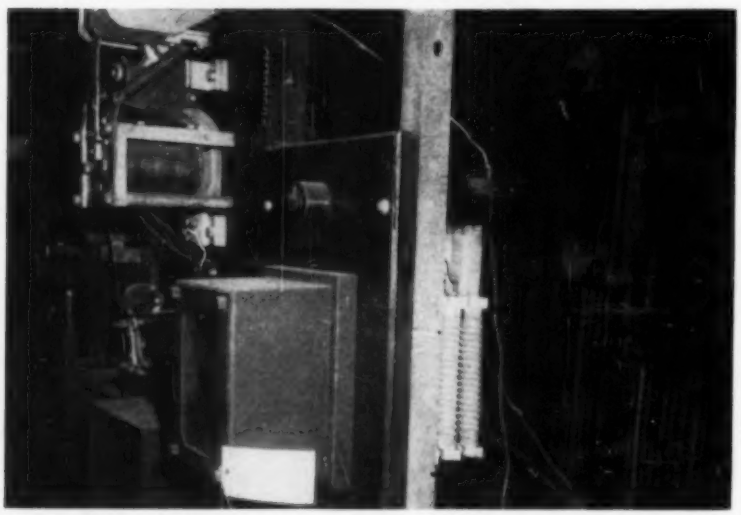
EFFICIENCY WITH BELTS

Continuity of operation with a minimum of manpower is a major reason for the growth in belt transportation in coal mines, particularly for panel haulage but to a significant extent in mainline transportation. One of the large mining organizations in the country, as an example, has standardized on belt transportation for its underground mines for a decade or more. In addition to the normal benefits resulting from high-capacity trackless mining, this company has observed a major decrease in service labor for mine operation. At one plant,



MODERN POWER SOURCES include AC centers such as this, which cut moving labor 90% in one low-coal mine (CA—June, 1952, p 86).

For Better Face Power



HIGH-TONNAGE MINING reflects use of load distributors in power improvements for greater productivity (CA—March, 1953, p 88).

for example, producing around 6,000 tons of raw coal and 4,500 tons of cleaned coal per day, service labor at the end of 1950, excluding construction, belt moving and the like, was as follows (*Coal Age*, November, 1950, p 69):

Greasing and inspecting belt conveyors—Three men one shift.

Belt attendants—Five men per shift or 10 per day.

Handling and recovering supplies—Ten men per shift or 20 per day.

Wire installation and maintenance—One man one shift.

Pumping—One man per shift or two per day.

Over all the company's deep mines, tons per man engaged in service work, including idle-day and extra work, averaged 27 to 28, or approximately 50% more than the average derived from a survey covering mines producing a substantial portion of the national tonnage.

UPPING BELT RESULTS

Practices which experience indicates will result in longer belt life and maximum performance with safety and a minimum of manpower include the following:

1. Proper Facilities for Handling Belting. These include reels for winding up belt and holding it while moving from one location to another.

2. Accurate Alignment and Rigid Mounting of Conveyors. These are the major factors in keeping belts running straight. As a backstop, training idlers may be installed at necessary intervals.

3. Proper Splicing. Whether splicing is mechanical or otherwise, the best is required. Permanent belts should of course, be vulcanized.

4. Proper Protection for Belts and Drives. Protective equipment includes limit switches at head and tail to stop the belt if it starts to run off the pulleys; automatic switches, such as the roller type, to stop the conveyor if the belt breaks, if there is excessive drive-pulley slippage, or if there is choking of feeders or chutes or piling up at transfer points (paddle switches are widely used to guard against pileups); emergency control cords the entire length of the conveyor to permit stopping it at any point when necessary (the same cord also will stop the conveyor if the roof falls); and use of covers of the more fire-resistant type, such as neoprene. Interlocking of drives and sequence starting and stopping are other major guards against spillage and pileups.

5. Good Loading and Transfer Facilities. These are vital in reducing belt wear and damage and promoting smooth operation. If possible, coal should be placed on a belt conveyor with the fines first, in the same direction as the belt and at the same speed. With these conditions met, and with cushion idlers at the impact points, smooth flow is assured and wear and tear on the belt and conveyor is reduced to a minimum. Chute design at loading and transfer points therefore requires real study and experimentation. Hinges and counterweights are essential where coal is being fed onto a conveyor already carrying coal from a point to the rear. Skirting at loading points also contributes to the preceding goals. Dual skirting similar to a labyrinth seal is recommended by conveyor authorities. The inner skirt board forms the load and deflects it away from the outer skirting, which prevents fines from seeping through.

Where belts receive coal from shuttle cars, the time required for the shuttle car to discharge becomes a major factor, aside from the importance of chute design in belt life. Devices to permit fast shuttle-car discharge include separate surge conveyors with capacity to receive the shuttle-car load at maximum rate. A second plan is a special control to speed up the belt while the shuttle car is discharging, and also speed up the mainline belt when the discharge from the side conveyors exceeds a

certain rate (*Coal Age*, July, 1948, p 82).

6. Good care and maintenance. Belt users generally agree that men should be assigned to patrol, inspect and lubricate belts continuously, and that cuts, tears and gouges should be taken care of promptly. Where a large quantity of belting is in service, some companies have found it pays to provide special maintenance shops. Others use custom shops with similar facilities.

LOW-COST TRANSFER

With mechanical loading and continuous mining, even small delays can have a serious effect on productivity at the face and consequently on cost, as, for example, stopping a mother belt for 5 min to change trips and as a result stopping two loading machines for the same length of time. Aside from the cost of delays at the face, the aim also should be to make transfer operations as laborless as possible, thus killing two birds with one stone.

A simple form of installation for this purpose is a remotely controlled car puller with a switch operated by the buggy runner. Thus, the buggyman controls trip movement past the elevator. Locomotives with the brakes tightened and the controller on the first notch, and energized by a switch at the elevator are another alternative. Greater flexibility is provided by the newer hydraulically or chain-operated barney-type trip movers, which may be reversed to facilitate car spotting and handling. All are designed to provide precision spotting with a minimum or no labor.

When conveyors, particularly belts, load into mine cars, the problem is even more acute and involves means for diverting the coal from one car to the other as the trip is moved to prevent spillage or stopping the conveyor. Again, the trip-moving device may be any one of several types, while transfer without spillage or stoppage may be accomplished by overlapping the ends of the mine cars or using, for example, flop gates or reversible conveyors between the main belt and the cars.

Completely manless loading of trips has been accomplished at one operation using belts by a combination of pendulums actuated by the coal as it piles up in the cars and electric controls for inching and changing the overlapping cars (*Coal Age*, August, 1953, p 99).

CUTTING INDIRECT COSTS

Tearing up 1,000 ft of track and replacing the ties can easily require 50 shifts of labor or more, aside from the other costs involved. If the job need be done only every 8 to 12 yr, instead of every 2 or 3, the saving runs into real money. Treated ties make this saving possible, and are an example of the steps that can be taken to reduce the indirect costs involved in haulage operations. For a second example, consider the cost of a fall on the mainline that ties things up for 2 hr in the middle of the day.

The answer is design, construction and materials that last and require a minimum of attention. Wood for ties, roof support and the like therefore should be treated, and both track and roof support should be built to last and provide the maximum protection against things that could stop haulage movement. The same principle applies to the materials used in and the design of mine cars, locomotives and other rolling stock and facilities, including trolley and return. As a final example, a main turnout properly located and built and then concreted into place is not likely to give any trouble for the life of the haulway.

ECONOMICAL HOISTING

The belt slope has moved well into the forefront in coal hoisting, with lifts up to 870 ft. In a number of instances, the advantages are sufficient to warrant a substantial expenditure to replace conventional hoisting facilities. As an example, one mine not only reduced the cost of hoisting labor materially but broke a bottleneck that limited the capacity of the property. Operation of the steam hoist required seven men per shift for hoisting alone, plus two additional men in the boiler room. With the new slope and underground dump, two men now hoist a third more coal per shift (*Coal Age*, September, 1952, p 76).

Where shafts are preferred, modern controls now provide for automatic operation, with manpower in some instances reduced to one supervisor on the bottom. Similar equipment may be applied to many existing electric hoists to provide the same results. Aside from the electrical controls, the equipment includes automatic trip feeders, cagers and tripmakers, which can provide the benefits of minimum manpower in practically any type of dumping or caging operation. And when it comes to operating and maintaining shaft-hoisting equipment, including the handling of men, new shaft phones of the "radio" type provide real benefits.

CUTTING TRAVEL TIME

At better than $2.50 an hour for traveling as well as for work, an extra 15 or 30 min in travel time can add up to a large sum of money and a major increase in cost. Consequently, sizable investments are warranted in many instances to relocate portals and keep travel time to a minimum. In addition to putting the entrance closer to the face, new portal facilities, including modern elevator equipment, loading stations and special man-trip cars, speed up movement all along the road and provide the maximum in safety. In addition, modern facilities make for better morale and pride in the job.

Time is equally important in supervision and in construction and maintenance activities. Consequently, more and more mines are installing jeeps and similar equipment to cut down travel time for supervisors and for repair, construction and maintenance crews. The latter activities also are made more efficient by car designs which permit taking along the necessary tools and materials for the jobs in question, thus saving time not only for the crews but also reducing, for example, the time a loading machine is out of service.

Power for High Production

Whether it is AC or DC, or a combination of both, the goal in power for underground equipment is again keeping that equipment, particularly at the face, working at as near capacity as much of the time as possible. The critical factor is voltage equal to the nameplate rating at the motor terminals. Nameplate voltage provides these major advantages:

1. Machine Operation at Rated Capacity. As voltage drops, machine speed drops nearly in proportion, particularly with DC. Therefore, a 10% drop means a drop of 10% in the ability of the machine to produce.

2. More Willing Men. Sluggish machines and frequent interruptions create a "So what" attitude among operators and crew members. Thus, low voltage penalizes in a second direction.

3. Less Lost Time. When voltage drops, motors try to make up for it by drawing more current. The result is heat, which burns out or shortens the life of trailing cables, motor insulation and so on. Machines are down oftener and longer, and the repair bill goes up accordingly.

Keeping substations close to the working face and providing ample

DITCHES promote low-cost gravity handling of water as at this new mine opening (CA—Feb., 1951, p 106).

LESS MANPOWER results from modern practices, such as aluminum pipe and special couplings (CA—June, 1951, p 81).

For Drainage and Ventilating Results

LOW-RESISTANCE AIR TRAVEL is provided by such clean, unobstructed and well-supported airways as this (CA—May, 1953, p 114).

LEAKAGE PREVENTERS include plastic spraying, which saved in one instance 17,000 cfm in 10,000 ft (CA—April, 1951, p 90).

capacity in the positive and return legs of the circuit are the time-tested methods of keeping voltage up to nameplate rating. Naturally, of course, it is assumed that sufficient capacity to supply the load is provided in the form of AC or DC substations.

AC permits transmission of current at high potentials, meaning smaller conductors, longer distance and a small drop in voltage. Also, conversion equipment is unnecessary and AC motors normally are smaller and less expensive to build and maintain. AC is not suitable for haulage, however, and this, plus simplicity and the fact that the system is well known, are sufficient reasons for extending DC to other operations where track haulage is chosen. If it is desired to use shuttle cars for haulage in an all-belt mine, a modification is a combination system in which the shuttle cars can be operated off special conversion equipment or by means of batteries. A new conversion unit for this special service is the selenium rectifier.

POWER BUILDERS

Where AC is chosen and the voltage limit is nominally 220, space and weight limitations of trailing cables make it essential to keep transmission distance down to not more than a few hundred feet. However, if 440 v is used in an intermediate run, the distance from transformer station to face may be increased accordingly. To facilitate moves, the substations should be on wheels or skids. Dry-type transformers can eliminate fireproof housing and installation on separate splits. Capacitors should be included in the power centers to reduce voltage loss, cut conductor and motor heating and permit longer trailing cables. Y-connection and neutrals grounded, with current transformers to trip the breakers when trouble occurs, protect both men and equipment.

With DC at 250 to 275 v, conditions at each mine influence the problem of keeping nameplate voltage at the motors while balancing conductor power losses against investment in copper. Based on all factors, the maximum distance probably will fall in the range of 1,000 to 2,500 ft. Portable substations not only make it easier to keep within these distances but also reduce the labor involved in moving the stations. Other factors improving the safety and reliability of service and at the same time reducing labor for installation and maintenance include the following:

1. Regular voltage checks by portable or fixed recording meters or both.

2. Separation of the face and haulage circuits to promote voltage stability, though the circuits may be served from the same source. And where substations, such as on haulage roads used by large locomotives, are subjected to heavy peaks, load distributors help prevent interruptions in power supply as a result of circuit-breaker outages.

3. Sectionalization of the circuits, including the use of hand-operated isolating switches in trolley and feed lines, and automatic reclosing circuit breakers in main, branch and tie feeders, reduce fire hazards, prevent wire annealing and protect units in other sections against outages as a result of trouble in one area.

4. Use of junction boxes and modern circuit centers, with circuit-breaker protection for both machine and operator, promotes safety and saves time in moving and connecting cables. A solid ground from the machine frame is now accepted as the best method of preventing injuries and fatalities in the operation of electrical equipment. With ground-trip relays, machine protection also is assured through the operation of the breakers. Sectionalization of trailing cables into standard lengths made up with the necessary plugs and receptacles saves machine and man time and in addition makes it easier to achieve good repairs and vulcanization of splices.

5. Automatic substations save operating manpower. However, even if attendants are required by local conditions, they can contribute by grinding bits, splicing cable and so on.

Low-Cost Water Handling

Water, by its presence in excess quantities in the working place, can directly affect the production of loading units. It also can affect it indirectly, for example, if its presence along the haulage road in excess quantities makes it difficult to keep track in good condition, with consequent slowness and interruption in mainline haulage.

Planning to keep ahead is of course as necessary in water handling as in all other forms of mining. As a basis for planning, a contour map of the bottom is a prime requisite. It will permit anticipating the direction of flow and locating openings, workings and sumps accordingly, in addition to determining how much gravity flow is possible and which sections will require pumping.

KEEP WATER OUTSIDE

When water is kept out of the mine it doesn't have to be handled inside. Measures to this end include the following.

1. Grout or cement strata, including stream beds where cracks exist.

2. Construct surface ditches to divert water from areas where openings into the mine exist or will be likely. This includes streams that might give trouble, provided public authorities permit their diversion or damming.

3. Provide dikes or levees as necessary where flash floods are possible.

4. Collect water in rings or sumps in shafts and slopes to prevent having to handle it from the bottom.

PUT GRAVITY TO WORK

Permitting water to flow out by itself saves pumps, pipe, labor and power. Methods employed include:

1. Openings to the outcrop where natural conditions permit to permit natural discharge. These openings may include boreholes from inside the mine.

2. Ditches or tunnels to carry the water outside or to sumps for central pumping.

3. Boreholes through pillars or through humps to shorten distance, circumvent hills and permit drainage outside or to large central sumps.

PUMP EFFICIENTLY

It is seldom that all water inflow can be prevented or all water handled by gravity, which brings pumping into the picture. Among the things that facilitate pumping and conserve manpower are the following:

1. Portable, lightweight, automatic units for use in working places.

2. Concentration of main pumping to cut labor and travel time in attendance and maintenance; permit better power service to the pumping units; and permit, in many instances, pumping at off-peak times, provided sump capacity is sufficient for the necessary storage. Vertical deepwell turbine pumps are finding increased use to reduce underground construction and maintenance; facilitate service, by putting the drive units on the surface; and provide for dewatering from low points which otherwise would be inaccessible because mining had passed the points. Twin units, whether underground or on the surface, minimize the effects of pump outages and permit a more-efficient balance between pumping capacity and fluctuations in water flow.

3. Keeping static head to a minimum by proper location of pumping stations and such things as special openings or boreholes—inclined, level or vertical.

4. Keeping friction head to a minimum by using pipe of the largest possible diameter and taking steps to prevent building up of deposits on the interior walls.

5. Making pumping stations automatic as far as possible to conserve manpower for attendance.

6. Using corrosion-resisting materials for pumps, valves and pipes to prevent early failure, with attendant interruption of operation, higher maintenance and increased cost of materials.

7. Finding possible uses for water, such as in sprinkling underground, fire protection and so on, thus converting at least part of the operation into an asset.

Production-Supporting Ventilation

Good ventilation not only means better face operation by making sure that the men in the work zone receive the air they need, it also means a ventilating setup that is economical to operate and maintain.

The starting point is a survey of current status to determine, among other things, the following: (1) fan condition and operating characteristics (2) pressure drop in the airways, (3) prevailing velocities, (4) water-gage waste at regulators, (5) leakage around doors and through stopings, and (6) the manpower necessary to build and maintain the ventilating facilities.

The reasons for study and action in ventilation, among other things, are based primarily on these principles:

1. Quantity varies directly as velocity.

2. Pressure, or water gage, varies as the square of the velocity.

3. Power varies as the cube of the velocity. In other words, doubling velocity requires nine times the power.

COST-CUTTING METHODS

Keeping these basic principles in mind, some of the steps that can be taken to cut cost include the following:

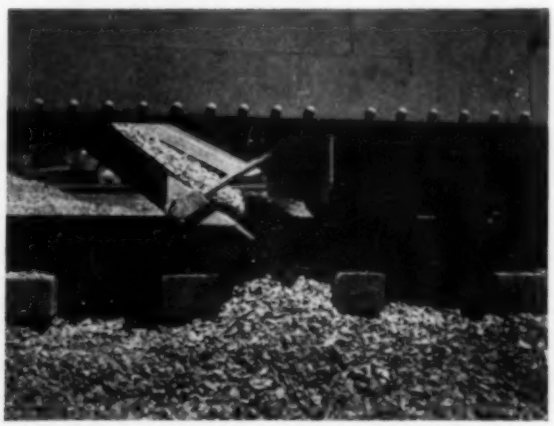
1. Employ Efficient Fans. Modern fans in many instances produce the same air quantities with as little as one-third the horsepower required by

HALF-HOUR SAVING in travel and a cut in cost of transporting supplies were reasons for these new portal facilities (CA—Dec., 1953, p 96).

EFFICIENCY saves two man-shifts per day in handling sand (CA—June, 1953, p 124).

For Better Supply Service

LOWBOY facilitates handling cable reels with safety and a minimum of time and labor (CA—March, 1952, p 85).



BALLAST CAR with drop-type adjustable gate does its own spreading with less manpower (CA—Oct., 1953, p 116).

older models. Series fans sometimes show lower power costs where resistances are high, with an alternative the newer high-pressure fans providing more air in a small unit at lower speeds. Where resistance is low, fans in parallel may be the answer. Multiple-fan installations, incidentally, permit shutting down some units during idle periods to save power and wear and tear on the equipment. Standby drives, either spare electric motors or internal-combustion engines, should be considered for many installations. Among other things, this may prevent withdrawing the mine force as a result of fan failure. Also, automatic signals in distant fanhouses are a natural step to warn authorities of stoppages.

2. Provide One-Way Travel. Return travel back to the fan naturally requires extra and unnecessary power if the spent air can be dumped at the end of its run. In addition to drift and shaft openings, large-diameter core-drill holes now are an economical means of achieving one-way travel. Such holes also can serve as emergency escapeways.

3. Provide Ample Airway Capacity. The need for ample capacity grows out of the fact that power varies as the cube of the velocity. Therefore, extra airway capacity to reduce velocity results in a substantial power reduction.

4. Reduce Airway Resistance. Major steps to this end are smooth ribs, elimination of abrupt bends and constrictions, and elimination of all possible obstruction, such as legs and collars. The latter is a further argument for roof-bolting where possible. Even further steps may be beneficial. At one operation, as an example, the main airways were diverted through a solid-top area of the mine to prevent falls and deterioration. Naturally, cleaning up old airways and keeping them clean and free of refuse, as well as from pools of water, help in keeping resistance down.

5. Prevent Leakage. Air at the face is the goal. If 40% is lost before the air reaches the working sections, the mine is penalized as a result of a larger investment in fan equipment and a substantial and continuing charge for extra power. The major losses are around doors and through leaky stoppings. In the matter of permanent stoppings, it is estimated that the annual cost of a jointless concrete wall is only one-fourth that of a rough wood stopping over 15 yr. One of the newer methods of preventing leakage through stoppings is spraying with plastic compounds. At

one mine (*Coal Age*, April, 1951, p 90), spraying a 10,000-ft aircourse cut leakage from 37,000 to 20,000 cfm.

6. Split for Efficiency. Proper splitting, in addition to conforming better with legislative and other safety standards, can save considerable money by reducing water gage. Splitting, however, requires the use of regulators, and cases sometimes arise where forcing enough air into a long split requires regulating the others to the extent that power is increased. Answers include breaking up the long split or putting an auxiliary fan in it where it can be brought out the surface. The cost of providing for additional splits can be reduced by such measures as using corrugated tubing for overcasts.

7. Build to Conserve Manpower. Ways of reducing the labor and cost in ventilation itself include designing the workings to promote one-way travel and thus reduce the number of stoppings and overcasts to be built and maintained; use of newer steel and similar types of recoverable stoppings for semipermanent airways; installation of permanent trouble-free linings in ventilating openings, plus stoppings of the same characteristics, to reduce maintenance and cleanup labor and cut leakage; elimination of all possible doors to save construction and maintenance labor and cut leakage; and use of automatic doors.

Cutting Cost in Supply-Handling

The supply problem in mining involves expense in not one direction but two:

1. Cost of the supplies themselves.

2. Cost of procuring, receiving, protecting and delivering supplies to the point of use.

The goals in supply-handling therefore should be:

1. An adequate but not excessive stock of all supplies and materials needed in mining, and particularly of the critical items that can result in long production shutdowns if not on hand.

2. Efficient labor-saving methods and equipment for receiving, storing, handling and distributing supplies.

3. Careful control, protection and education to prevent waste and spoilage of parts and materials.

Low voltage, for example, can run up supply cost by burning up cables and motors. Machine abuse does the same thing. Throwing a bunch of roof bolts off along the rib where they can get covered up and forgotten of course represents a direct loss. Carrying heavy crossbars from truck to a remote stack consumes extra manhours. Having to send outside for a conveyor flight to repair a loading machine cuts the tonnage while the wages go on, running up the cost. And so on.

ACHIEVING SUPPLY ECONOMY

Checking the practices that run up supply cost requires, as in any other operation, a thorough study of mining practices, supply-handling methods and possible steps to improve them. Among the steps that can lead to improvement are the following:

1. Match Stocks to Mine Needs. Daily tonnage, number of machine types, calls for various items, spare equipment policy, opportunities for quick shipments from outside, and maintenance practices affect the level of supply stocks. To reduce investment in stocks alone, as well as in storage and handling facilities, the level should be kept at the minimum consonant with efficient mine operation.

2. Control Replacement. Once the level of supplies is determined, accurate control of ordering, receipt and disbursement is necessary to maintain the level while preventing overstocking or shortage. The perpetual inventory system is accepted as the best for these purposes. Convenience is promoted by record cards in a rotary file or record sheets in a looseleaf book, both showing at all times receipts, prices, items issued, stock on hand and when to reorder.

3. Prevent Loss and Destruction Through Equipment Abuse. The answer is a record showing where the material goes, by section and type of machine. Thus, when it appears that excessive quantities are being chewed up, the proper steps can be taken. These steps include education of both men and boses, including giving them figures on costs of parts and materials, showing them what happens as a result of machine abuse and carelessness, asking them to think before they jettison or damage a supply item, and urging them to round up and report stray material.

4. Institute a Salvage Program. As noted previously, all employees should be trained to round up and turn in all stray or damaged supplies or parts. Where the operation is large enough, regular salvage crews might be employed and provided with special facilities for reclaiming machines, parts and materials where their condition warrants such reclamation.

5. Protect Material. Rain, snow, dust, rust, decay, mildew and other factors result in loss of materials and parts before they can be used. Proper protection against weather, and against fire, includes proper storage sheds, bins and containers, including covered containers for oil and grease; stacking of timber and other items off the ground; use of heat and ventilation to prevent dampness and mildew; and preservation of the original wrappings to prevent rust and corrosion.

CONSERVING MANPOWER

Organization and equipment is the major difference between a low-cost and a high-cost supply system. Steps to conserve manpower and raise efficiency include:

1. Satellite Supply Station Near the Working Sections. These keep key items close at hand and reduce machine delays.

2. Mechanized Distribution Underground. Steps to achieve this goal include special tracks or roadways along belts; specially designed supply cars for track service—explosive and detonator, sand, lubricant, subassembly and parts cars, and so on; special battery or cable trucks for delivery to the face in trackless mining; small hoists at the face for pulling up supplies in pitching coal; dollies for pan lines; and special hoists, pullers and carriers for moving equipment.

3. Mechanized Handling and Storage on the Surface. Examples include the mobile crane; truck- and trailer-height ramps for unloading heavy materials and parts from freight trucks or cars, and for moving them into or out of storage buildings or spaces; convenient storage racks and platforms for steel, timber and the like, with hoisting facilities as required; provisions for unloading timber and other materials directly to supply cars or trucks; oil-storage facilities equipped with chain blocks, working-height racks and provisions for fast filling of containers or lubricating trucks; automatic or semiautomatic sand-drying facilities with provisions for direct dumping from trucks and with boreholes, where possible, for taking the sand to loading stations underground; good bin equipment for small items, with ladders or stools for convenient access; and shafts and reels for storing and paying out and measuring cable, rope and the like.

REMOTE CONTROL MINING to a depth of 350 ft is achieved with this continuous miner and team of 22 articulated conveyors. Controls are housed in rubber-tire-mounted building at left. Coal recovery is about 70%.

UNDERGROUND OBSERVER with microphone follows miner as it bores into coal. Second man checks conveyor.

REMOTE CONTROLS for continuous miner are operated from rubber-tire-mounted center in strip pit.

Remotely Controlled Miner

How push-button controls operated from the outside direct an underground continuous miner served by 22 articulated conveyors, recovering up to 70% of the available coal.

REMOTE CONTROL push-button coal mining is receiving new impetus as a result of development of new techniques by the Mech Mining Co., Kittanning, Pa. Using a remotely controlled underground continuous mining machine coupled to a series of similarly controlled articulated conveyors, the Mech Mining Co. is currently recovering coal up to 350 ft beyond the stripping limit.

The present site of the new remote control installation is an area 15 mi north of Kittanning, Armstrong County, Pennsylvania, that was stripped to approximately a 50-ft highwall. The unit operates two shifts per day in producing coal from the Upper Freeport seam, which averages 44 in in thickness. The coal is sold by the Pittsburgh & Shawmut Coal Co., also of Kittanning.

For several years C. M. Shoffner, president of Freebrook Corp., Kittanning, Pa., has been exploring various ideas for extracting coal from highwalls. The unit which he felt offered the best possibilities was the Colmol-Molveyor combination. When he read of the success of the remotely controlled Carbide miner in West Virginia, he decided it was time for Freebrook Corp. to try to develop remotely controlled mining with the Jeffrey units and the experiment was started. Freebrook handled the experiment until September, when it was decided that the Mech Mining Co. should continue the work.

A Jeffrey Model A Colmol and 24 Molveyor units were selected for the mining and conveying job and a Barber-Greene Model 674 elevating belt conveyor was added for elevating the coal into trucks. Remote controls were provided by mounting, on an outside panel board, control buttons and switches for control of the motions

PROTECTIVE STEEL HOOD is positioned against highwall by crane before miner is trammed to highwall.

APPROACHING HIGHWALL is remotely controlled miner. Directions are transmitted by wire to control room.

POWER AND CONTROL CABLES for conveyors and continuous miner are supported by brackets on conveyor units.

TRANSFER POINT where coal leaves continuous miner and begins journey over articulated conveyors.

Works 350 Ft Beyond Highwall

similar to those on the Colmol itself, then connecting them to the miner with suitable cables. Solenoids were added to operate the hydraulic valves controlling the various motions. The entire remote-control panel for the Colmol operates on 120 v AC. Included in the panel board are three DC ammeters used to indicate to the panel-board operator when the upper and lower cutting head and tram motors on the Colmol are overloaded.

One man operates the panel board and controls all movements of the miner. He is directed from underground by a man speaking into a public address system that carries the message to the control station. The underground control director is responsible for keeping the Colmol out of the roof or bottom, for cutting breakthroughs on 50-ft intervals and for keeping the miner moving in a straight line.

The Molveyor is DC-operated, the same as in an underground setup. One switch on the receiving end of the conveyors controls the forward tramming of the units as they follow the Colmol. This switch permits tramming to be either automatic or manual. Normally, tramming is automatic unless some unusual condition is met. Reverse tramming away from the coal face is controlled by a switch located at the discharge end of the Molveyor.

Movement of the belts also is controlled from the discharge end. To start the belts, a push-button switch controlling the belt on the discharge end is depressed, thus setting this unit in motion. When the first belt is up to speed, a centrifugal switch on this unit starts the second belt. Similarly, each successive belt is set in motion.

SEAM CONDITIONS

Remote mining currently is carried out in the Upper Freeport seam, which averages 44 in in thickness. Overlying the seam is a layer of bony coal ranging from 0 to 4 in in thickness. There is a thin binder in the seam about 4 in from the bottom but this does not hinder the Colmol as it advances.

Overlying the bony coal is shale of varying hardness. In the present pit the material is relatively friable but there is no indication of weight on pillars or sloughing of the highwall where the coal has been mined. There also has been no indication of weight underground. Underlying the seam is a soft fireclay that becomes very soft

CONTINUOUS LOADING from alternate chutes aids production. Elevating unit is mounted on modified truck chassis powered by 7½-hp electric motor. Last conveyor unit was modified to extend over end of elevating conveyor.

TYPICAL MINED AREA has no evidence of weight on pillars.

VICE PRESIDENT in charge of operations is M. A. Shoffner.

when it is in contact with water.

The area of coal in which the remotely controlled units are now working is relatively consistent as to thickness and dip. Natural conditions at present do not slow output.

MINING THE COAL

Preparation for mining consists of bulldozing loose material away from the coal with a Caterpillar D7 unit so that clean, fresh coal is available for the Colmol as soon as it begins mining. In addition, the pit floor is cleaned and smoothed by an Allis Chalmers HD 19 bulldozer with scarifier and two Tournadozers each pulling a 15-yd Caterpillar scraper unit.

No tramming difficulties have been experienced in operating the belt units on the pit floor during summer and fall. To keep them out of the mud and water during the winter months, 10-ft-square wooden mats have been made to serve as a portable roadway. The majority of these mats are made of 2-in-thick lumber, but seven heavy-duty sections for use under the Colmol and the first three Molveyor units are made of 4-in-thick lumber. Only four of the heavy mats are in service at one time, the others being used to speed movement of the miner and conveyors to a new mining position. They are placed adjacent to the wooden roadway to permit the miner to tram to a new setup without delay after completing a passageway.

Before the Colmol enters the coal, an 8x14x4-ft steel protective cover is set in place against the highwall by a crane. The steel support protects the man directing the remote-control-panel operator until the miner has advanced far enough to permit him to be underground.

The Colmol cuts an oval-shaped entry as it enters the highwall. Maximum width is 9½ ft. The straight part of the opening is 8 ft 3 in wide. It is possible for this Model A Colmol to cut a passage between 36 and 46 in high. The height mined is governed by the thickness of coal and roof conditions in the immediate area.

Once the miner starts advancing, it continues 75 to 80 ft. Then it is trammed backward 25 ft and a breakthrough is cut through to the adjoining completed entry. Breakthroughs are driven on an angle and only far enough to provide a 4-ft opening. After the miner holes through to the adjacent area it is trammed backward and then advanced to the face to continue mining. Breakthroughs are cut on 50-ft centers and straight posts are set by a second underground man whose duties are to set timbers and check on the Molveyor as mining progresses.

All movements of the Colmol as it advances are controlled by the outside panel-board operator who receives his directions via the public address system from the underground observer. The observer can move freely back and forth in the passageway and concentrate on machine performance whereas with a conventional setup the machine operator would spend much of his effort on actual machine operation and would be restricted to a very small area of movement. With the remote-control system, the observer can carry his microphone back along the Molveyor if necessary and check it while the Colmol continues to advance.

The miner-conveyor team currently

is mining to a depth of 350 ft. Openings are driven on 12- to 13-ft centers, leaving about a 3-ft block of solid coal between. To date there have been no falls or evidence of weight on pillars. Recovery of coal is about 70% and compares very favorably with that attained in deep mines in the central Pennsylvania area. Faces have been advanced at an average rate of 16 in per minute and advance now is even better.

The topography in the mining area is hilly and cover over the area presently being mined is about 100 ft.

Coal discharges from the Molveyor to the Barber-Greene elevating belt conveyor and is delivered by chute to trucks. Both the Molveyor belts and elevating belt travel at a speed of 400 fpm. At the end of the elevating unit is a two-direction chute that directs coal into either of two waiting trucks. This permits loading of one truck while a second empty unit is moving in under the other side of the chute. At no time is the flow of coal from the miner interrupted by placement of trucks.

Ventilation at the face is provided by a blower fan delivering air through tubing placed in the adjoining room. The tubing enters the working entry at the last breakthrough and discharges at the end of the Colmol.

REMOTE-CONTROL SYSTEM

The remote controls for the Colmol provide the same number and type of controls as those on the machine. These control buttons in effect have been brought outside and mounted on a panel in a control office. The control panel operates on 120 v AC supplied by a 10-kw converter unit housed with the DC substation delivering power to the Colmol.

The following control buttons are incorporated in the remote-control panel board:

1. An emergency stop button that can be used to stop all motors of the Colmol.
2. Cutting-head electric motors.
3. Tram electric motors.
4. Raise or lower cutting head.
5. Tilt cutting head.
6. Spread cutting head.
7. Forward and reverse on each crawler.
8. Low- and high-speed tram.
9. Hydraulic-fluid volume-control valves, low-speed tram.

In addition to the control buttons, the panel also has a DC voltmeter and three ammeters. The voltmeter measures the voltage delivered to the Colmol and the ammeters measure the current flowing to the upper cutting-head motor and tram motor. By watching the ammeters, the remote-control panel-board operator can prevent overloading of any of the electrical motors on the Colmol, thus preventing overheating and possible electrical failure.

Power for the control circuit is carried to the Colmol through a 21-conductor rubber-covered cable.

CONVEYOR CONTROL

Control of the Molveyor units is by push buttons located at the ends of the conveyor system. Once the belts have been started and the units put in automatic tram, they need only periodic checking to assure proper alignment behind the Colmol. When the miner has advanced 6 in in the coal, the automatic tramming mechanism automatically advances the Molveyor a like distance.

Movement of the elevating belt conveyor is interlocked with the Molveyor. As the Molveyor advances its 6-in limit, a switch connected with the elevating unit tram motor is contacted, setting the unit in motion. When it has advanced to the Molveyor, the same switch is operated through another electrical contact and advancement is stopped. Movement of the elevating unit may be controlled separately if desired.

POWERING THE UNITS

The Colmol and Molveyor are supplied with 250-v DC power generated by separate substations. The miner receives its power from a 200-kw General Motors twin-diesel unit while the conveyor units are powered from a 100-kw Waukesha-Hesselman diesel unit. In addition, a second 200-kw General Motors twin-diesel unit is kept in the pit as a spare.

Power for the Colmol is delivered from the substation by three 3-conductor 4/0 stranded-copper neoprene-covered cables. Each cable leads to one of the 50-hp electric motors on the miner.

The Molveyor also receives power transmitted by a 3-conductor 4/0 cable. A selenium rectifier setup is used to provide protection against feeding power in both directions. The system is also interlocked as an added protection.

A 10-kw converter unit housed in the Molveyor substation delivers 220-v AC to a 7½-hp motor that powers the elevating conveyor unit.

MOUNTING THE ELEVATOR

A conventional truck tractor was remodeled to house the 7½-hp motor. The cab and gasoline motor were removed and the electric motor mounted in their place. A semi-trailer was built to fit the frame of the elevator and equipped with hydraulic steering mechanism at both ends.

Steering is controlled at the discharge end of the Molveyor by the man who also handles placement of trucks under the loading chutes.

The discharge end of the Molveyor was altered and extended so that coal would be discharged onto the elevating unit without spillage.

MINING RESULTS

The remotely controlled unit went into experimental operation on Jan. 30, 1953, and since that time much progress has been made in improving equipment, controls and methods. Adding to the normal problems encountered in trying new methods was a 14-in layer of tender roof immediately above the coal at the first location.

In the middle of April, the unit was moved about 30 mi to a new pit. Better natural conditions and solution of many of the initial operating problems convinced management that the idea of a remotely controlled continuous-miner-conveyor setup was fundamentally sound and that many advantages were offered by such an installation.

With all the possibilities still not explored, the following advantages of remote-control mining already are evident:

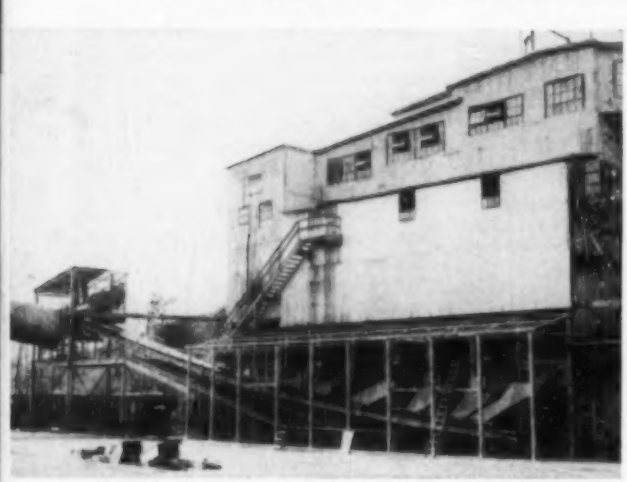
1. Recovery of coal will be about 70%, comparing favorably with that in deep mining.
2. Isolated islands of coal can be completely mined from the highwall, whereas they are now abandoned after stripping or partially recovered by auger mining.
3. Areas that could not be mined because of tender roof can be mined profitably with this method.
4. Remote control permits mining in one continuous lift except when breakthroughs are cut.
5. Flow of coal is uninterrupted from the face to the truck except when a breakthrough must be cut or a new hole started.

FUTURE POSSIBILITIES

The mine management is directing experimentation toward total control from the outside. So far they have been unsuccessful in devising a system which will indicate whether or not the miner is in the coal although a number of methods have been tried including television cameras mounted on the Colmol. They expect to be able to recover coal which would be considered dangerous to personnel, since with the remote indicating and control system only machinery would be exposed to danger.

SIX TRUCKS, each receiving different sizes of coal, are served simultaneously at P & R's new installation. Preset dials accurately control delivered tonnages. Push-button-controlled conveyors move coal from breaker storage to truck chutes.

Push-Button Truck Loading



BREAKER STORAGE consists of six bins, one for each size of coal. Bin chutes also acting as gates are controlled from truck-loading house.

PIPE HOUSES the two 24-in conveyors connecting breaker (right, below) and truck-loading facility (left). Pipe structure requires only two A-frames in 150-ft span.

New two-man installation at Philadelphia & Reading's Oak Hill breaker streamlines truck service with fast, accurate, automatic loading of six coal sizes.

COAL DELIVERED DIRECTLY from the mine breaker to truck should, in theory, offer a speedy, economical means of procurement by industrial users, wholesalers and direct retail haulers. However, inefficient, makeshift loading facilities, in many instances, have instead spelled lost time in underweight or overweight loads, poor truck-maneuvering facilities or lack of variety in the available sizes of coal.

Relying heavily on sales to truckers, the Philadelphia & Reading Coal & Iron Co. determined that this should not be the case at its new Oak Hill colliery, near Minersville, Pa. The result of its decision, combined with the engineering skills of its own organization, plus those of A. R. Amos Co., Philadelphia, and the Barber-Greene Co., Aurora, Ill., is a two-man "push-button" operation which is a model of efficiency in the anthracite field.

To the trucker, the new facility is simply a large structure from which he can draw, with virtually no effort, an exact weight of any of six common sizes of anthracite. However, hidden by the building's exterior are various innovations and design features contributing to the plant's efficiency of operation.

At the breaker, which is housed in a separate building, individual bunkers of 60- and 80-tons capacity store the six sizes available: stove, nut, rice, pea, buckwheat and barley. Each bin is equipped with an electrically controlled gate that, in its lowered position, doubles as a

chute. Two 24-in-wide belt conveyors serve three bunkers each, or three individual sizes, and are used to transfer the coal from the storage bins to the pipe-housed connecting conveyors.

One man supervises the transfer from the breaker to the truck-loading pockets. When automatic "tell-tales" indicate that one is running low, he presses a button and an additional supply is drawn from the main storage at the breaker and conveyed to the truck-loading bin.

Two 24-in rubber belt conveyors—the link between the breaker and the truck-loading house—are supported side-by-side within a 96-in-diameter Armco corrugated metal pipe, with sufficient room between the conveyors to provide a manway. Use of this pipe housing solves various problems. First, the belts can carry coal in any weather. Also, the pipe construction, since it is both a housing and a support, minimizes the framework necessary to support the conveyors. Between the breaker and the loading house, a distance of 150 ft, there are only two A-frame supports. They are securely attached to the pipe by mounting sills and saddles in which the pipe rests.

Once the coal has been carried to the truck-loading structure, it is deposited on one of two Barber-Greene shuttle conveyors. Both conveyors are self-propelled, and one also is reversible as to direction of belt travel. Push-button controls permit positioning each shuttle conveyor, which serves three pockets, to place the incoming coal in the right pocket. Availability of two parallel conveyors permits handling two sizes at the same time.

At the bottom of each pocket is a Barber-Greene Model 75-F flight feeder, controlled by an unusually accurate electric weight device.

HOW MECHANIZED TRUCK LOADING WORKS

Here is what happens when a trucker drives under a pocket to receive his load. (Incidentally, he arrives well refreshed, having stopped for free coffee in the office.)

After pulling his truck into position under the proper bin, he notifies the operator of the desired tonnage. The operator simply sets a dial for this figure, then presses a button beneath the dial. Measurement is entirely automatic. The chute is lowered into the truck to the right level by the operator, and the flight feeder operates, delivering the coal at a maximum of 5 tpm. As the load pours into the truck, the chute is lifted by push-button control to distribute the load and prevent jamming. When the dial completes its preset circuit, it breaks the connection, the feeder stops and the chute is raised back into position so that the truck may pull out unhindered.

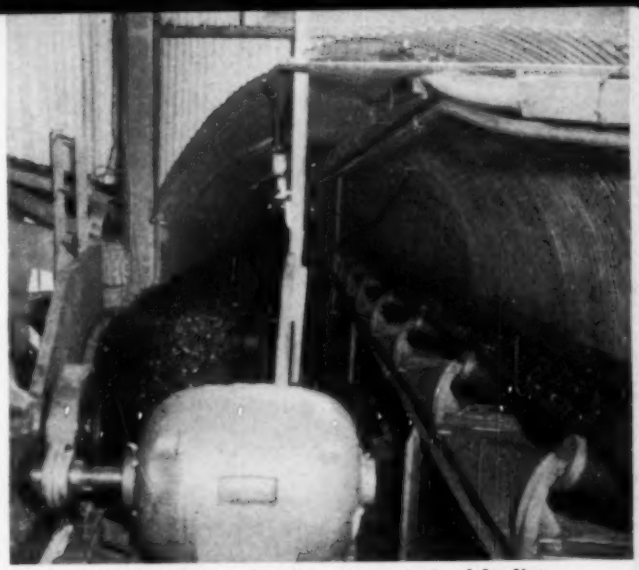
Although the driver stops to weigh his load at the outgoing scale, there is rarely any need for trimming the load to the exact weight.

Fractional tonnage can also be delivered with equal ease, since the dials are calibrated not only in tons, but in tenths of a ton as well. Even split loads can be put on the truck with accuracy and with little lost motion on the part of the driver.

Clean coal is another feature of Oak Hill's truck-loading system. The coal is sprayed as it passes over lip screens in leaving the breaker, then sprayed again as it is deposited into the trucks. Driveway drains carry off any surplus water.

To prevent any possibility of coal freezing in the pockets, a steam-heating system has been installed to keep the interior of the pockets always about the 32-deg level.

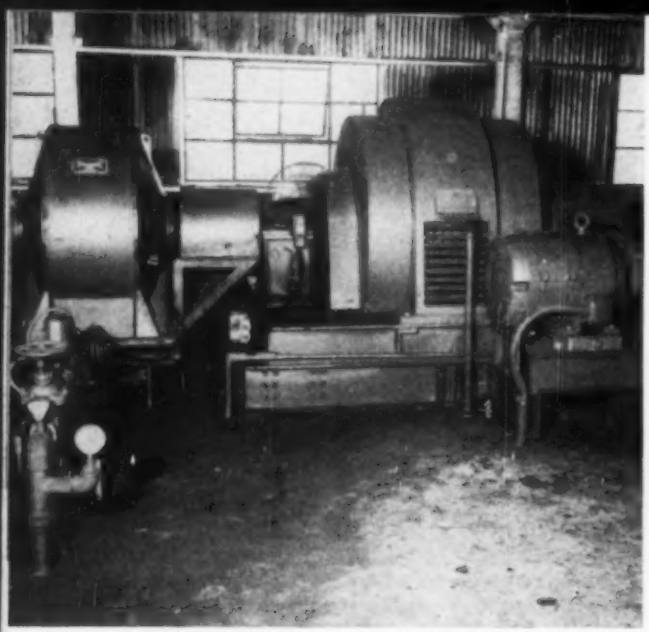
Oak Hill colliery's truck-loading installation was formally opened Oct. 5 in ceremonies attended by more than 300 persons prominent in the anthracite field.



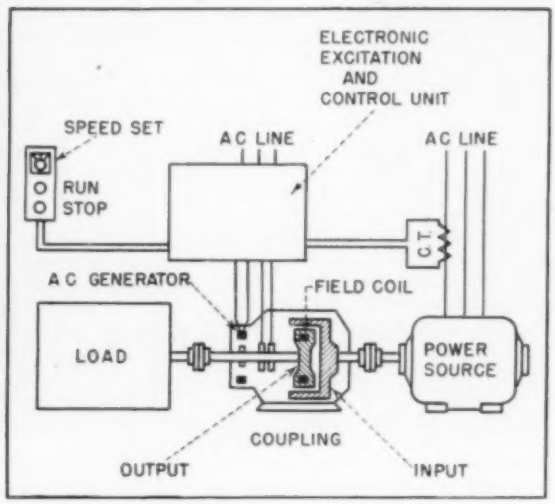
COAL IS CARRIED from breaker storage to truck-loading pockets by two 24-in belt conveyors inside 96-in corrugated pipe. Each conveyor handles three sizes of coal.

TWO SHUTTLE CONVEYORS take coal from 24-in belts, each delivering to any of three truck bins inside loading station. Control board at right operates chutes and conveyors at breaker.

PRESET MEASURING DIALS and push buttons (below) automatically control a flight feeder delivering accurate tonnage at rates up to 5 tpm to trucks underneath.



TORQUE TRANSFER between 1,500-hp synchronous motor and drive pulley is regulated by eddy-current coupling left.



PRINCIPAL ELEMENTS in the Orient No. 3 slope-belt drive shown in schematic arrangement.

How Drive Design Improves

By R. R. RICHART
Electrical Engineer
Chicago, Wilmington & Franklin Coal Co., Benton, Ill.

STEPLESS ACCELERATION of the 3,300-ft-long 16-deg single-flight slope conveyor with an 868-ft lift at Orient Mine No. 3, Chicago, Wilmington & Franklin Coal Co., Waltonville, Ill., is achieved by a drive made up of a synchronous motor and eddy-current coupling. This modern mine, using only continuous mining machines and both rubber-tired and belt haulage, began large-scale production from a 14,000-acre tract of Illinois No. 6 coal in June, 1950. Representing something new in Illinois, full-seam retreat mining, including the extraction of pillars usually left as roof support, is working successfully under 800 ft of cover.

The drive for the 42-in 1,200-tph steel-cored belt provides governed speeds ranging from creeping or inspection to full operating speed of 625 fpm. Coal loaded on the belt at the underground bin is discharged at the surface cleaning plant 5¼ min later. Besides turning the armature, or inductor drum, of the eddy-current coupling, the 0.8-PF 900-rpm synchronous motor compensates for two-thirds of the lagging rkva required by the induction motors in the preparation plant.

Although the eddy-current coupling is not an AC device, it is an accessory that provides variable speed from a constant-speed AC motor. This adjustable-speed water-cooled coupling, through control of its DC field, regulates transfer of torque between the motor and belt drive pulley.

FULL VOLTAGE STARTING

The 1,500-hp 4,160-v General Electric synchronous motor is started across-the-line ahead of the other motors in the cleaning plant. Otherwise, the momentary 20% dip in the high-line voltage might cause some starters to disconnect their 440-v motors from the line. The motor was designed for a locked-rotor kva inrush limited to three times normal, or about 4,500 kva. This design was acceptable to the Illinois Power Co. for full-voltage starting on its 5,000-kva 69/4.16-kv substation ½ mi away.

The pull-in torque rating of the motor at full-voltage starting with minimum locked-rotor inrush was designed to be 50% when connected to an external-load inertia of 6,200 lb-ft². The motor turns the armature drum, the lighter of the two rotating coupling elements. The low WR^2 of this drum imposes a relatively light inertia load on the starter motor.

The motor is connected to the 4,160-v bus by one of 20 vertical-lift roll-out-type metalclad air circuit breakers at the mine. These 1,200-amp breakers, with an interrupting rate of 150,000 kva, are closed and tripped from 125-v control batteries.

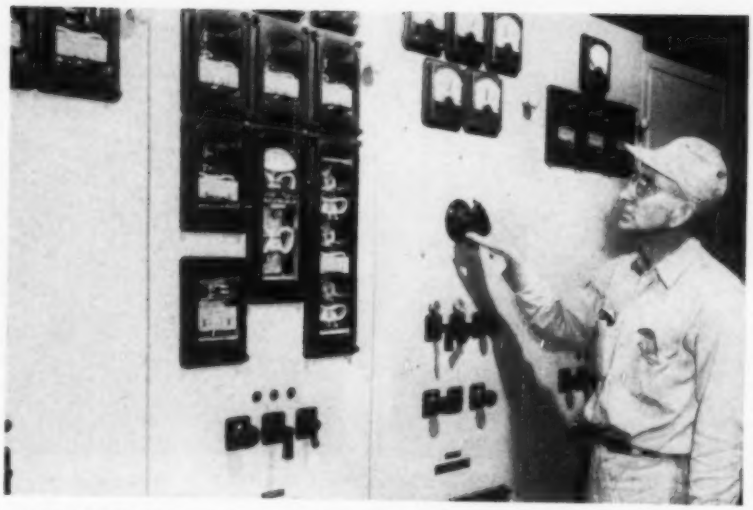
MOTOR PROTECTION

Differential protection is one of several protective features incorporated in the motor control. It is used to detect internal winding faults, other than turn-to-turn faults, and operates by comparing the current entering and leaving the motor. The setting of each differential relay can be made quite sensitive since normally the current entering and leaving the motor is equal. This type of protection tends to minimize damage to the motor by disconnecting it before the fault current can reach sufficient magnitude to cause the line circuit-breaker overloads or the short-circuit relays to operate.

Many more devices help to effect the optimum in motor protection:

1. Bearing temperature relays.
2. Undervoltage protection and, when starting, open or reversed-phase sequence.
3. Automatic field application through the use of a slip-cycle impedance relay. The relay will remove

Adapted from a paper presented at the AIEE Middle Eastern District meeting, Charleston, W. Va., Sept. 29-Oct. 1, 1953.



TWO PANELS of the 4,160-v switchgear required for the 1,500-hp motor. Feeder (right) is energized when motor operates as generator for emergency power.

Slope-Belt Operation

excitation if, after synchronization, the motor pulls out of step because of overload, drop in line voltage or loss of excitation.

4. Current-balance and single-phase protection.

5. Thermal heater to remove motor if excitation is not applied in time.

6. Inverse time characteristics and voltage-restraining coils in AC induction disk-type overcurrent relays. The voltage-restraining coil improves relay sensitivity because less current is required to operate the relay as voltage is reduced.

7. Induction-type temperature relay using a Wheatstone bridge circuit and resistance-temperature detector coils embedded in the stator winding to protect motor against overheating resulting from excessive load.

8. Overload protection for stator and squirrel-cage windings.

9. Time-delay undervoltage protection to permit motor to ride through momentary voltage dips.

10. Bearing pedestals insulated from the motor bed plate to prevent shaft currents that would pit and waste away the babbitted bearings.

11. Motor forced cooled with 6,000 cfm of air drawn through a self-cleaning-type air filter.

The 1,500-hp motor is the only power-factor-correcting unit on the mine system, aside from a small synchronous m-g set on the elevator man hoist. This 0.8-PF motor can deliver 60% of its horsepower rating, or 900 kvars at full load, and 72%, or 1,080 kvars, at half load. The field is adjusted to permit the motor to deliver only 750 kvars during hot weather.

The mine power factor is about 94% lag. About 1,000 kvars are needed to make it unity. Of the 1,000 kvars, 700 are needed on the underground branch to correct for the wound-rotor-motor belt drives and the 500-kw ignitron rectifier stations.

HOW COUPLING EASES STARTING

The time constant and cushioning effect of the magnetic field in the coupling produces a smooth clutching or engaging action for starting the belt. The Model 46WC-12 eddy-current coupling, supplied by the Dynamatic Corp., a subsidiary of the Eaton Mfg. Co., consists of two independent rotating elements arranged concentrically in a common housing. The low-carbon-steel drum, or input side, of the coupling is driven by the motor at 900 rpm. The inner element, or output side of the coupling, carries the field poles and drives the large speed reducer and belt-head pulley. A permanent-magnet-type tachometer-generator, an integral part of the output shaft, provides an AC voltage proportional to speed for governing control. The speed of the output shaft can be varied from zero to about 870 rpm.

Eddy currents, usually considered detrimental to the efficiency of rotating electrical equipment, are purposely created and controlled to transmit torque by the Dynamatic coupling without resorting to mechanical contact or frictional means.

When the field poles of the coupling are excited, magnetic lines of force span the narrow air gap and penetrate the steel drum being rotated at a constant speed by the motor. As the teeth of the field sweep the inductor drum, pulsating flux set up in the drum will generate eddy currents. The induced eddy currents develop a second field which varies with the strength of the primary field and the relative speeds of the two rotating members of the coupling. The attraction between the two fields causes the output side of the coupling to begin rotation in the same direction as the drum. Thus, torque is gradually applied to the belt-head pulley.

COUPLING OPERATION

Slip speed, or slip, is the difference in speed between the input (constant-speed) and output (variable-speed) coupling shafts. Unless there is a difference in speed (slip) between the two shafts there can be no useful torque. The slip is at maximum when the output shaft is standing still and at minimum when the belt is traveling empty at 625 fpm.

As the slip increases, the magnetic lines of force move through the drum faster, producing more and stronger eddy currents which react with the field magnets to produce more torque at the output shaft. A difference in speed and a change in excitation affects the torque developed by the coupling. The point at which speed stability is obtained depends upon the amount of excitation current and the torque demand of the load. The voltage from the tachometer-generator is used to modulate automatically the electronic control and cause it to supply the exact amount of DC to the coupling coil to match a given load condition.

The coupling, being a slip device, must reject the slip power loss as heat. This heat is readily removed by water cooling since the eddy currents developing the torque flow near the surface of the inductor drum.

Before the coupling can be excited, water at 55 psi must be available at the water controls adjacent to the coupling. Upon indication of sufficient pressure and, if AC is available for the electronic excitation equipment, water is bypassed around the temperature-controlled valve in a ⅜-in line to insure a minimum flow through the coupling. This stream of water divides

and enters the unit through nozzles at the bottom of the coupling. The nozzles direct the water into troughs on the backplate of the constant-speed drum. Holes in the backplate distribute the water evenly through the air gap between the constant- and variable-speed members.

The water, after absorbing heat, flows out the discharge outlet on the centerline of the coupling housing. As the temperature in the coupling rises, additional water is admitted through a temperature-controlled valve.

Treated water in a closed system is used to cool the coupling. In summer, the water entering and leaving the coupling is 85 and 105 F, respectively. The warm water is returned to a supply tank above the circulating pump in the plant basement, some 48 ft below the coupling. This pump forces the water through a Ross water-to-water heat exchanger where the heat is removed prior to storage in a surge tank and return to the coupling. A duplicate standby pump starts in the event of a sudden drop or failure of pressure at the coupling water-inlet opening.

Still another pump circulates raw water from a 19,000,000-gal reservoir through the jacket of the heat exchanger to carry away the heat transferred between the two water circuits.

At full speed the water in the air gap between the constant- and variable-speed coupling members improves efficiency because it is effective in producing torque. The film of water bridges the 0.030-in gap and acts in shear when any relative motion exists between the two members.

The over-all operating losses of the water-cooled coupling at rated speed and torque are about as follows:

	Per Cent
Slip loss	3.5
Water acceleration loss	0.3
Bearings	0.4
Excitation	0.2
Total	4.4

It was noted earlier that the torque is transmitted through the coupling without mechanical contact or frictional means. This isolation of the moving parts enables the coupling to act as an untuned damper when transmitting power. Oscillatory or torsional vibration cannot be transferred either way through the coupling. Therefore, little maintenance is required. The coupling effectively cushions the drive.

BELT CONTROL AND PROTECTION

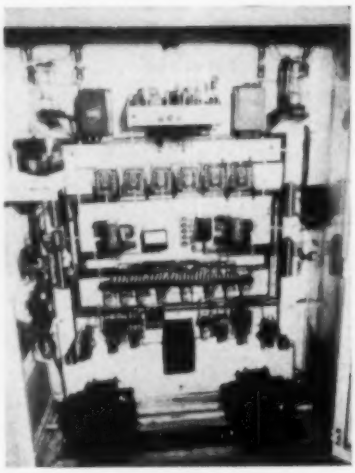
How the electronic control functions to excite the coupling and govern speed under varying conditions of load is described at the end of this paper by the Dynamatic Corp. However, I should like to note some of the more important changes incorporated in the new control unit installed in January, 1953. The 1950 control featured the following protective interlocking:

1. Water-pressure switch.
2. Water-temperature switch.
3. Brake-wear limit switch for the Nordberg brake, released by oil pressure and set by gravity weight.
4. Back-up limit switch.

Speed control was provided through a manually operated rheostat graduated from zero to 100 divisions.

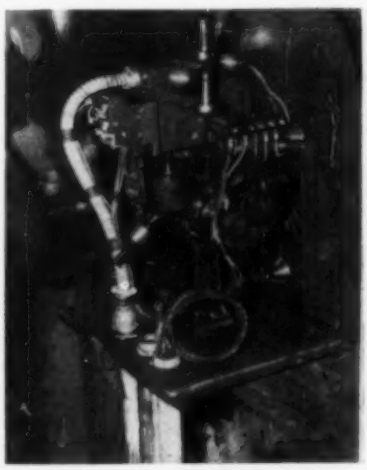
Shortly after the belt was placed in service it was decided that a definite period of time should be used in accelerating the belt. Too often, when starting was left to the operator's discretion, the belt was brought up to speed in 15 or 20 sec. For good belt service the starting time should be three times as long.

Abrupt stopping of the belt under the condition of emergency braking also was bothersome. When the operator knew in advance, he would make a prepared stop by slowing the belt through the use of the hand rheostat. Then the belt would be almost stopped before final cutting of the excitation and setting of the brake. When it was impossible to use this procedure, or if the power failed, the

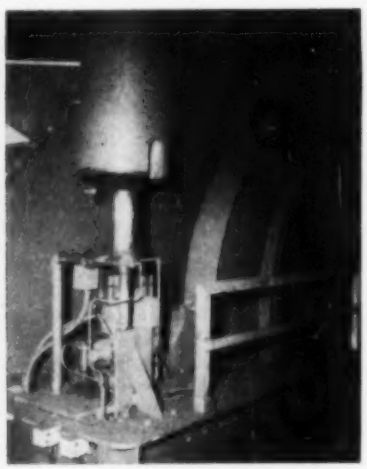


DUAL-UNIT electronic excitation equipment for the eddy-current coupling was installed in 1953.

SLOPE BELT is operated from this control center. Three more centers control 440-v motors in the plant.



LILLY OPERATOR protects belt against rollback and permits coasting before the brake is applied.



PRESSURE RELAYS (lower left) deenergize the eddy-current coupling as the brake is applied.

result was an emergency application of the brake.

Both of these conditions were corrected in the new dual-unit controller installed this year. Two motorized potentiometers, with timing cycles adjustable from zero to 90 sec, provide automatic acceleration of the belt conveyor once the operator pushes the start button. Both potentiometers are required so that two starts can be made in quick succession. A second circuit is ready for use while the other potentiometer is returning to zero. Either potentiometer may be stopped and restarted at the operator's discretion as the belt is being accelerated.

Throwing a transfer switch changes the control from automatic to hand, permitting the operator to have complete control of the belt through the hand rheostat.

A Lilly hoist operator, made by the Logan Engineering Co., was installed to help solve the problem of emergency braking and to provide a way to automatically increase excitation of the coupling when the belt attempts to roll back under load, once the brake is released. The Lilly operator is a speed-actuated governor mechanism operating a number of electrical contacts and is chain driven from the shaft between the large speed reducer and the belt pulley. This shaft turns at 32 rpm to give a belt speed of 625 fpm.

It was desired to have the application of the brake, following the deenergizing of the coupling, delayed until the head pulley had slowed to 3 rpm. or about one-tenth operating speed. This was accomplished by using a contact on the Lilly operator and power from a 125-v control battery.

Another contact energizes a solenoid coil to lift a ratchet pawl as long as the belt is traveling forward faster than one-tenth normal speed. Below this speed, the solenoid is deenergized and the pawl drags over the teeth on the ratchet wheel. The instant the belt stops and reverses direction the pawl engages the ratchet wheel to rotate a rocker arm. This rocker arm, with seven mercury switches, performs two functions.

1. As the arm turns, five of the normally-closed switches open in sequence. If the belt is being started and the rollback is a result of a heavily loaded belt, then the switches automatically increase the excitation of the coupling to roll the belt forward.

2. Should the arm continue to turn, the other two mercury switches will deenergize the coupling and apply the brake.

Much thought was given to the interlocking between the motor, coupling and brake. The motor will not start or run less the ventilating fan is operating. The coupling cannot be excited unless the 4,160-v circuit breaker and the field relay for the motor are closed and the brake is released. Neither is it possible to set the brake without removing the excitation from the coupling simultaneously. Two oil pressure-relays, one indicating pressure in the supply system and the other pressure in the brake cylinder, in conjunction with a contact on the Lilly operator, provide the interlocking between the brake and the excitation circuit.

CONTROLLER MAINTENANCE

One question, of course, is whether we have experienced any operating delays arising from the servicing of the electronic control. So far, in 3 yr of operation, the troubles have been limited to tube replacements. The short delays that have occurred have not hurt.

At the end of the first year's operation three tubes costing $7.88 were replaced. Six months later a complete set of tubes was replaced at a cost of $74.74. This year we have experienced loose connections on two tubes. However, the terminals were resoldered and the tubes placed back in stock. No troubles have been reported on potentiometers or condensers. As the tubes weaken the coupling fails to accelerate properly. When 80 to 85 points of excitation on the hand rheostat fails to start an empty belt, it is time to replace the tubes.

A 10-cylinder 1,600-hp Fairbanks-Morse opposed-piston-type diesel engine, already purchased, is to be installed in line with the 1,500-hp motor. Upon failure of power-company service, an Airflex coupling will be inflated to lock the motor and engine together, and the engine will be started on compressed air. The motor, capable of delivering 1.125 kva at 4,160 v as a generator, will provide adequate power to ventilate the mine and operate the man-shaft elevator. No attempt will be made to mine or prepare coal during such an emergency.

In summary, the synchronous-motor eddy-current coupling belt drive for "hoisting" coal has flexibility of control and avoids high peaks in power demand. The 220-v DC excitation load required by the coupling is about 9 amp for starting and 5 amp while running. The power consumption for hoisting raw coal 868 ft by belt at Orient Mine No. 3 is 1.0 kwh per ton. The synchronous motor, started once a shift, helps correct power factor and improve voltage.

How the Electronic Coupling Control Works

Dynamatic Corp.

THE ELECTRONIC CONTROL SYYSTEM comprises a closed-loop speed-governing system when used with an eddy-current slip coupling. It has two main functions: (1) providing DC power for the slip coupling from an AC source, and (2) modulating the DC power to provide the required control features. Basically, the system utilizes a governor generator driven by the output shaft of the slip coupling to provide a voltage proportional to speed as an error-correction device. The output of this generator is, in effect, bucking against a reference voltage, which is adjustable by means of the speed-setting potentiometer, with the resulting "difference" voltage being amplified and fed into the grid circuit of the grid-controlled Thyratron-type rectifier. This results in a close-regulating speed-control system.

AC POWER FIRST RECTIFIED

The first duty of the control, which involves rectification of power for the slip coupling field, is performed by the circuits in Sec. I of Fig. 1.

Thyratron Tube E1 rectifies the AC power and also controls the magnitude of the DC power supplied to the coupling coil. The main, or plate-circuit, current is controlled by the low potential between Grid G and Cathode K. Making the grid relatively more positive with respect to the cathode increases the coupling-coil current and, conversely, making the grid less positive reduces coil current.

The grid voltage for the main rectifier circuit is supplied by the bridge-type amplifier designated as Sec. IV. This bridge is composed of three fixed-resistance arms, R2, R3 and R4, and one variable arm in the form of Triode E3. The DC power source for the bridge, regulated by the cold cathode tube, E4, is connected to Points 5 and 9, while the output between Terminals 7 and 8 is fed to the input grid circuit of the main rectifier Thyratron, E1. Thus, the bridge is similar to that used in making precise resistance measurements with the output feeding the Thyratron grid instead of a sensitive galvanometer.

Observing the polarity of the bridge power source as positive at Terminal 9 and negative at Terminal 5, it is seen that DC will flow through two parallel paths from 9 to 5. If Resistances R2, R3 and R4 and that of the triode, E3, are all equal, the same IR voltage drop will exist across both R2 and R3, thus making the voltage dif-

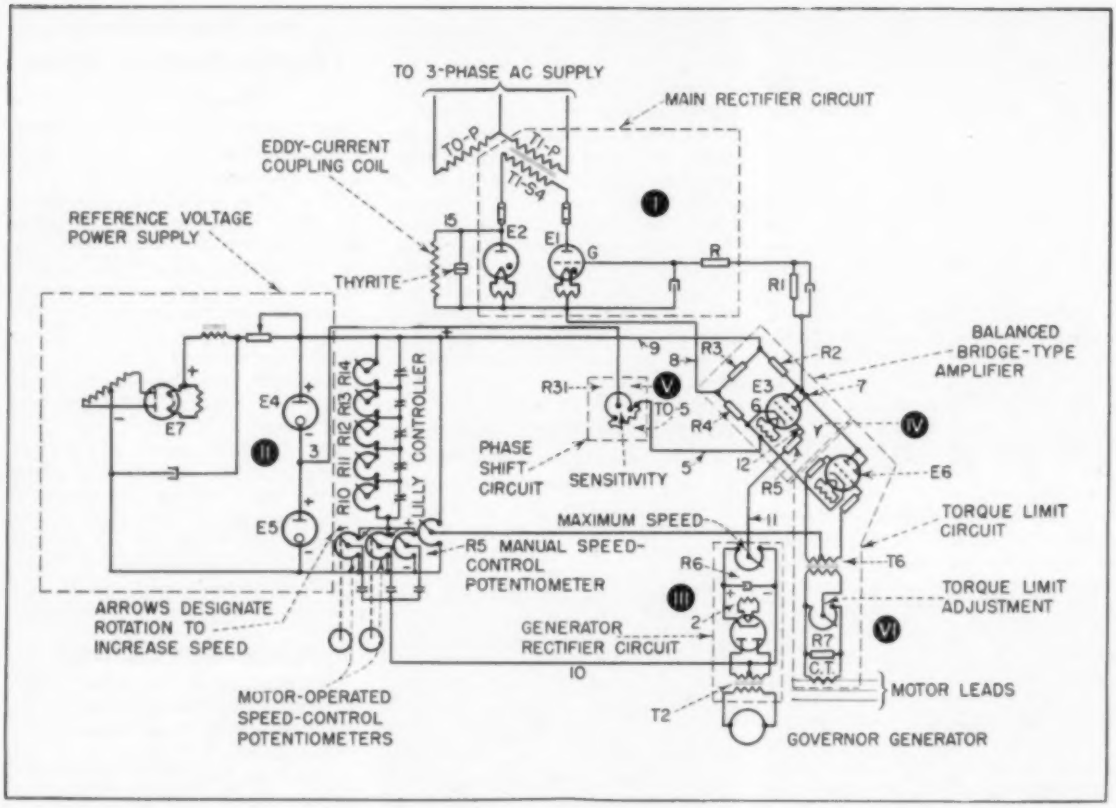


FIG. 1—FUNCTONAL schematic diagram for electronic control of eddy-current coupling. Transfer relays, etc., omitted.

ference between Points 7 and 8 equal to zero. If the resistance of E3 is now increased by making the grid of this triode more negative, the IR drop across R2 is reduced and Point 7 becomes more positive than Point 8. Such being the case, the Thyratron grid, G, is made more positive and thus current to the coupling coil is increased. Decreasing the resistance of Bridge Arm E3 by making the triode grid more positive has the opposite effect and so reduces the coupling coil current. Thus, the grid circuit of Triode E3 serves as a means for controlling the output of the main rectifier, with the bridge amplifying any signal introduced.

The grid circuit of E3 is composed of two principal voltage sources. One is shown as Sec. III, Fig. 1, where the output of the governor generator is stepped up, rectified and filtered, providing a DC voltage across Potentiometer R6 proportional to the coupling speed. The second is obtained at the speed-setting potentiometer to the left (note that three potentiometers, two motorized and one manual are shown in the diagram; only one is in use at a time) between the movable arm, Point 10, and, in effect, Point 3 between the two cold-cathode voltage-regulating tubes, E4 and E5. Tracing the grid circuit of Triode E3 through Points 12, 11, 10, 3, 5 and 6 discloses that these two voltage sources are in series opposition. Rotating the speed-control potentiometer in the "increase" direction makes the grid of E3 less positive, while any increase on the part of the generator voltage across R6 makes this same grid more positive.

At this stage, a more inclusive analysis may be made. Assume first that the bridge-circuit components are of such value that with the speed-setting potentiometer in the zero speed position, no current is supplied to the coupling coil and therefore there is no rotation on the part of the coupling output shaft and the governor-generator voltage remains zero. Moving the speed-setting potentiometer arm in the increase direction initially results in making the grid of Triode E3 less positive. As a result the bridge balance is changed and the Thyratron grid becomes more positive, resulting in current flow in the coupling coil and rotation of the coupling output shaft and the governor generator. Thus voltage is developed across Potentiometer R6 which opposes that existing as a result of rotating the speed-setting potentiometer.

When the speed of the generator approaches the set-point speed of the speed-control potentiometer, the voltages are approximately equal. As speed continues to rise slightly over the set-point speed, the generator voltage makes the grid of E3 sufficiently positive to change the bridge balance in the other direction, making Grid G of the Thyratron less positive and reducing the current in the coupling coil. This, of course, reduces coupling speed, and the generator voltage no longer matches that of the speed-setting potentiometer. As a result, the latter voltage again dominates and the complete speed-governing cycle is established. The speed actually oscillates above and below the set-point speed. The magnitude of these oscillations is very small and cannot be discerned using commercial speed measuring devices.

FINE ADJUSTMENT

The governing action previously described could not take place as ex-

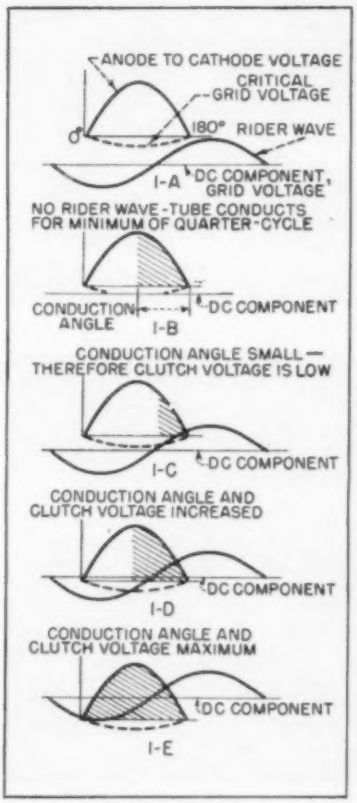


FIG. 2—HOW THE DC OUTPUT of the Thyratron tube varies with firing time, or angle.

plained were it not for the rider wave, Sec. V. Sec. V is essential to achieve complete stepless control over the Thyratron tube which has been mentioned as having grid-control characteristics in keeping with other three-element (triode) or "grid" tubes. Actually the Thyratron (being a gas-filled tube) differs from a vacuum-type triode in that current conduction is dependent upon ionization and, once started, it cannot be halted by any change in grid voltage. Deionization takes place only when the anode (plate-to-cathode) voltage reaches zero—that is, when conduction begins, it will continue as long as the anode is more positive than the cathode.

Effective grid control is achieved in spite of this, since the grid is able to delay indefinitely the start of a conduction period while it is negative with respect to the cathode by a value exceeding the rated critical grid voltage corresponding to anode-to-cathode voltages encountered.

Therefore the grid voltage can hold off conduction for any desired portion of the plate-voltage positive half-cycle. Consequently, the actual "firing" time can be regulated. Since the output voltage is a function of this firing time, or angle, it is seen that this voltage may be varied between zero and maximum by "triggering" the Thyratron tube between 180 and 0 deg with reference to the plate-voltage cycle, as shown in Fig. 2. This triggering accomplishes firing of the tube at the same point in each succeeding plate-voltage cycle, but control is regained once each cycle, as the plate voltage goes through zero at multiples of 180 deg.

Ignoring the rider wave in Fig. 2-A, it is seen that raising the DC component of grid voltage until it cuts the critical grid-voltage line results in the tube conducting through half of the available power cycle as in Fig. 2-B. A further increase in the grid voltage in the positive direction serves to increase the firing angle, since it begins to cut the critical grid-voltage curve nearer the beginning of the cycle.

Referring again to Fig. 2-A, where the rider wave is shown superimposed on the DC grid voltage and displaced 120 deg (lagging) in phase from the plate voltage, it is apparent that the tube first conducts over a very small portion of the power cycle when the rider wave is shifted upward as a result of making the DC component less negative.

Figures 2-C, D and E illustrate how the conduction angle increases as the rider wave is moved successively higher. This demonstrates that the addition of the AC rider-wave voltage to the DC grid voltage provides for a smooth clutch-voltage variation between zero and the available maximum. Sec. V of the basic circuit is included simply to furnish this AC grid-voltage component.

It is to be noted that the magnitude of rider-wave voltage can be altered by Potentiometer R31. This results in changing the slope of the rider wave along the portion that cuts the critical grid-voltage line. Hence the change in conduction angle and also the clutch voltage corresponding to a given change in grid voltage may be varied. As the rider wave is increased, more vertical displacement of the grid voltage is required to give the same change in clutch voltage.

It follows that the change in speed corresponding to a given load change will be increased with increased rider-wave voltages. Therefore, Potentiometer R31 is seen to be a regulation or sensitivity adjustment. Regulation is improved by decreasing the rider-wave voltage and is made poorer by increasing this voltage. Note that the primary of Transformer TO is connected across a different phase of the line-voltage supply from that of the anode transformer, TI, thus giving the required 120-deg phase shift. Thus a complete speed-regulating system is achieved.

TORQUE LIMIT PROTECTS MOTOR

Additional circuits are used to further modify the over-all coupling action. One of these, torque limit, is covered by Sec. VI (Fig. 1) and is provided where it becomes necessary to limit the rate of acceleration or where overloads on the AC motor or driven machine are considered undesirable.

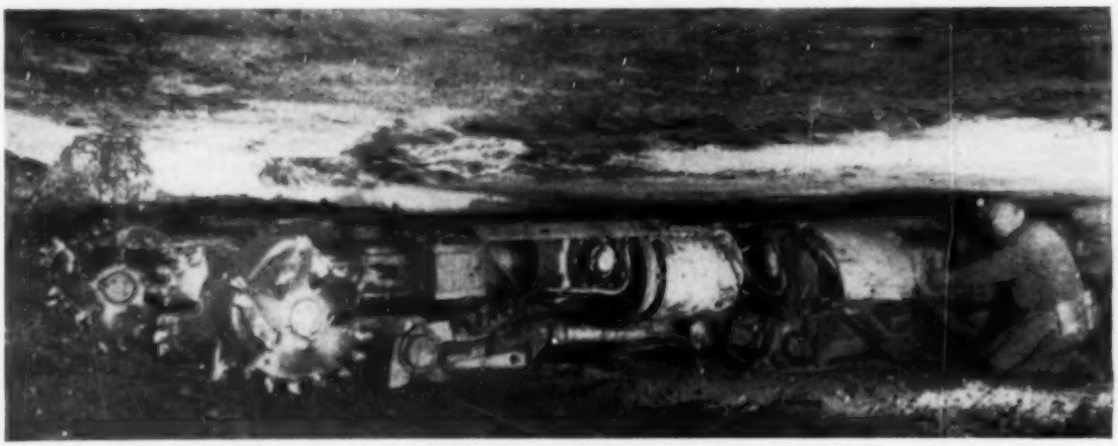
The torque-limiting circuit works basically as the governor-generator circuit, III, with the exception that the voltage source which causes the torque control, VI, to shut off Tube E1 is produced by a current transformer, CT. The latter furnishes voltage to a rectifier-amplifier tube, E6, through T6 and R7. The current transformer, placed in one leg of the AC motor, will reduce the current in the clutch when the motor load exceeds the load point set by R7.

Assuming that a torque value of not over 125% of normal for the motor is used, an adjustment can be made on R7 to meet this value. If, while accelerating the eddy-current clutch and its load, the current in the motor lead tends to exceed this value, then the voltage delivered by CT will rise and Circuit VI will overpower Circuit II so that Tube E1 shuts off. When this occurs, the clutch decelerates because of lack of excitation. The motor is coincidentally unloaded and the current in the motor lead drops off, thus removing the influence of Circuit VI on Circuit II. A current-governing action actually takes place, with the clutch being modulated to place a limit of 125% normal motor current during acceleration or any other overload period.

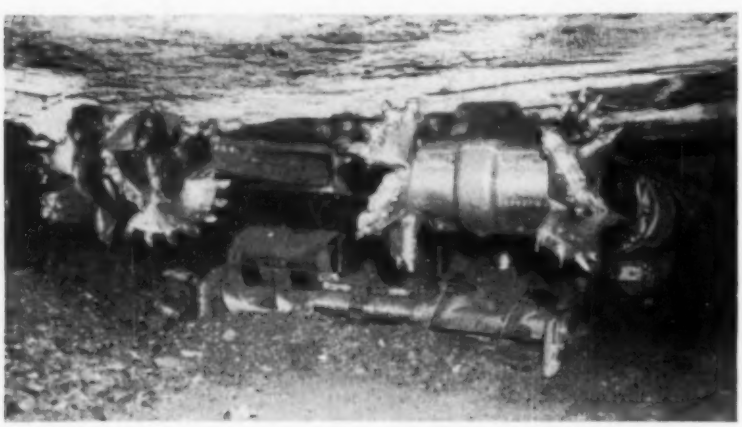
The half-wave mercury rectifier tube, E2, located across the load, provides a "flywheel" circuit for the magnetic energy stored in the coupling field during the off cycle of the grid-controlled Thyratron tube, E1. The absorption of stored energy must appear either as a dominating potential wave or current wave.

The Lilly controller has been added to provide increased clutch excitation as the conveyor belt rolls back under the influence of load. Successive opening of the contacts adds a predetermined resistance by virtue of Potentiometers R10, 11, 12, 13 and 14, and coincidentally increases clutch current.

CUTTER HEAD of new-type miner in raised position ready to start a downward pass.



CUTTER HEAD at bottom of its downward pass, illustrating advantages of a wide head in this coal.



Low Coal . . .
New Miner . . .
High Efficiency . . .

BUSINESS END of the new miner mounted on loading-machine chassis. Top view shows cutters at that point in the oscillation cycle when they are spread to full 8-ft width. At bottom, cutters have moved to their closest-together position in the center.

47 Tons per Man-Shift

How two men doing all routine work, including haulage and maintenance, average 94 tons per shift in 42-in coal with new continuous-mining unit mounted on loading-machine chassis.

AN AVERAGE of 47 tons of raw coal per man-shift in 42-in coal is the result of a pay-its-way experiment with a new small-capacity continuous-mining machine carried on for about 2 yr at the Hendrix mine of the Consolidation Coal Co. (Ky.), a division of the Pittsburgh Consolidation Coal Co., Deane, Letcher County, Ky.

Two men in the section—no more—operate the continuous miner, handle running maintenance, haul the coal by shuttle car to a section belt, rock-dust, extend pipe lines for dust allaying, put up curtains where needed, and erect the few timbers that are necessary. Experience with the new unit includes both development and pillar extraction, the former requiring very few timbers and the latter normal timbering at the open ends.

JUNIOR DESIGN

The machine is a Model CM33 Lee-Norse Junior Miner mounted on the chassis of a Joy 14-BU loader at the suggestion of Consolidation of Ky. The loader was supplied by the coal company. Locally, the new unit is referred to as the "Junior" or the "Gouger." Several years ago Consolidation officials pictured the probable operating savings with continuous miners but were not happy about the prospect of discarding a heavy investment in rubber-tired cutting machines and 14-BU loaders. Success of the Lee-Norse Co., Charleroi, Pa., in converting track equipment for off-track service prompted Consol officials to suggest that Lee-Norse try converting 14-BUs to continuous miners and thus save on investment.

The result—the Model CM33 Junior Miner—has a working head similar to the Lee-Norse miners exhibited at the 1953 Cleveland Coal Show. It is a full-face machine, cutting 8 ft wide, and is equipped with four rotary cutters, two on one arm of the head and two on the other. The two arms oscillate: that is, they first move horizontally toward each other and then apart. Rotation is such that the bits move down through the coal, and the bit supports are shaped so that there is a tendency to throw the coal toward the center.

A combination right- and left-hand screw conveyor close to the front of the pan, and driven by the head conveyor, handles the cleanup. This screw, of rugged construction and rigidly mounted, has a good loading capacity. It has proved its ability to load even slate. The Junior Miner is rated at ¾ tpm. It will mine seams ranging from 32 to 54 in in thickness. Tramming speed is practically the same as a 14-BU, or much faster than most continuous miners. Maneuverability is almost as good as a 14-BU.

In adapting the 14-BU chassis, the two traction motors, hydraulic pump unit and controller were retained in their original positions. The Lee-Norse head is driven by two Westinghouse 1,950-rpm 230-v DC motors, each with a 24-hr continuous rating of 12 hp with a 75 C temperature rise.

JUNIOR MINING

Mining with the Junior is in the Elkhorn No. 3 seam, lying fairly level and averaging 42 in at Hendrix. It is free of partings and usually has an excellent blue slate top which, in advance work, seldom needs any support. The coal is blocky and hard, and is completely free of sulphur balls and bands. The bottom is soft but not too soft for shuttle cars. The washing plant rejects approximately 11%, and this reject is principally bottom material. The premium coals prepared in this plant go to domestic and metallurgical markets.

The Junior Miner went into service single-shift in February, 1952. It was put on double-shift in February, 1953, and has continued on double-shift to the present time. One 2½-ton Joy 6-SC shuttle car, into which the miner discharges, hauls to the section belt. Haulage distance is kept as short as possible to minimize idle time for the machine.

Development with the miner consists of driving headings 15 ft wide on 60-ft centers both ways, thus leaving 45x45-ft blocks, which are robbed by open-ending. A feature of the miner is its ability to continue mining while the shuttle car is away, thus loading the conveyor and building up a pile of loose, quickly loadable coal between the cutter head and the loading screw.

Men for the Junior Miner crews were selected on the basis of proficiency in 14-BU operation and a knack for maintenance. They were given special training in lubricating and maintaining the miner. Maintenance of the shuttle car also is their responsibility.

Kennametal bits, the same as those on cutting machines, are used on the miner. A surprising feature is that bit cost per ton is less than for the rubber-tired cutting machines employed in conventional mining in other sections of the mine.

TWO MEN HANDLE SECTION

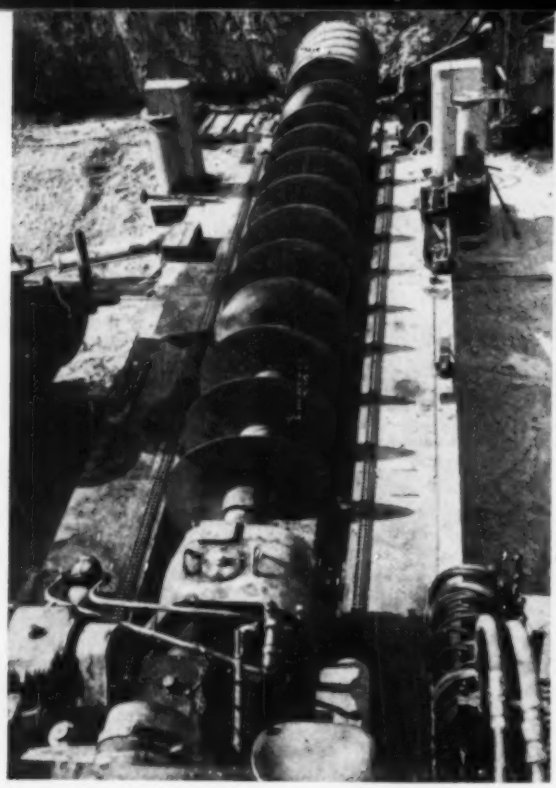
Two men, as previously noted, do all the routine work in the section. Building stoppings is one exception and is handled by a special crew that covers all sections of the mine. Extending water lines for the sprays on the miner—one of the routine jobs—is facilitated by Victualic couplings (*Coal Age*, July, 1949, p 94).

In mining the blocks, the roof falls occur regularly without setting heavy breaker timbers. Roof weight in pillar work aids the miner in breaking down the coal.

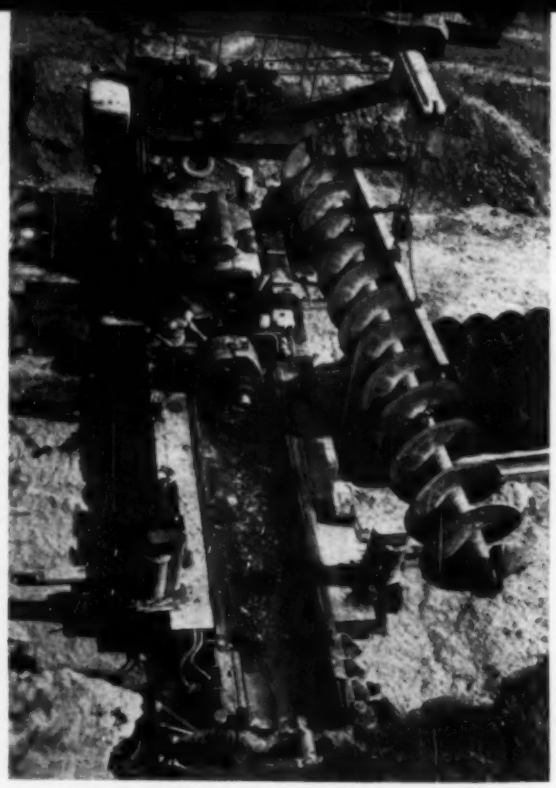
Mine officials are pleased with the cleanup ability of the miner and consider it even better than the 14-BU in that respect. In fact, cleanup is so good that no hand shovels are permitted in the section. The full-face cut also is considered a major advantage in continuous mining because maneuvering, which can be a high proportion of total time in low coal, is reduced. Complete screen tests of size consist have not been made.

The Junior Miner had produced 30,000 tons of cleaned coal to the date of preparation of this description. The 1953 performance, also on the cleaned-coal basis, was as follows: January, 40.4 tons per man-shift; February, 40.6; March, 43.8; April, 44.8; May, 38.8; June, 48.5; July, 37.2; August, 40.9; September, 42.1; October, 35.9.

Conversion of other 14-BU loaders to Junior Miners is under consideration. A pair would be operated under the supervision of one foreman and the present practice of using but one shuttle car and a two-man crew per machine would be continued.



APPLICATION of a 42-in highwall auger unit to recover coal beyond the stripping limit opened new opportunities to the Cleghorn Coal Co., Clarksburg, W. Va.



OVERHEAD CRANE lifts 24-ft auger sections from sled and lowers them to auger carriage while trucks change out. Unit is powered from auxiliary hydraulic system.

Auger Extends Mining Horizon

How small coal tracts previously strip-mined are recovered efficiently with a self-moving 42-in auger producing up to 500 tpd.

NEW OPPORTUNITIES in mining have been opened to R. B. Cleghorn Jr., strip and auger mine operator, of Clarksburg, W. Va., by application of a highwall auger to mine coal beyond the economic stripping limit. Near depletion of small tracts of coal requiring the use of smaller-type stripping equipment, such as owned by the Cleghorn company, plus market conditions hastened purchase of the 42-in diesel-powered unit this year. In the past, Cleghorn had specialized in strip mining small areas of the Redstone and Pittsburgh coal beds in the Clarksburg field. Rather than withdraw from the mining industry when new areas became practically nonexistent, the company decided to recover coal beyond the stripping limit with an auger. To assure ample reserves of coal for future auger operations, lease agreements were made with various strip operators in the Clarksburg area for mining rights.

A 42-in McCarthy auger, manufactured by the Salem Tool Co., was selected for the job. Auxiliary equipment assigned to the auger operation consists of a Barber-Greene combination chain-and-belt conveyor for receiving coal from the mouth of the auger hole and transporting it to trucks; an International TD18A bulldozer for pit cleanup work and moving auger sections stored on a steel sled; a Northwest 1½-yd diesel-powered shovel for loading coal from the stockpile and for general utility work; and two dump trucks for hauling coal from the auger to the stockpile.

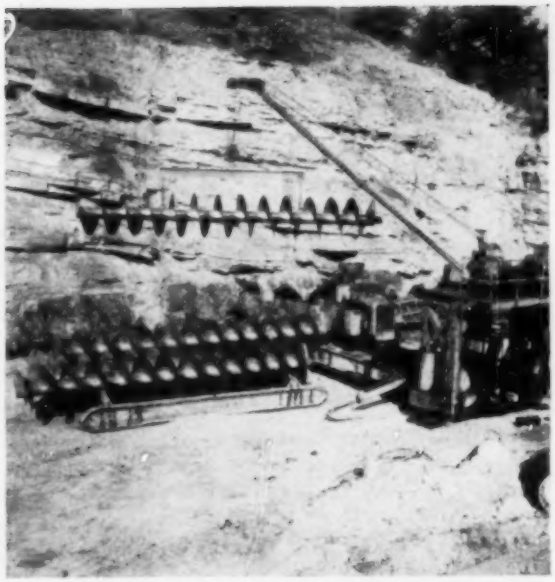
Operations currently are being carried out in the Redstone seam on a tract of land recently stripped to a 40- to 50-ft highwall. The coal varies from 50 to 60 in in thickness and contains some clay veins. It is overlaid by shales and some irregular bands of sandstone, and is underlaid by fireclay.

Production from the unit averages about 300 tpd and has been as high as 500 tpd on a single-shift basis. Output at the present setup is limited by somewhat unfavorable natural conditions that require moving the auger more often than normal. Clay veins are present in the Redstone seam and decrease drilling speed and coal output.

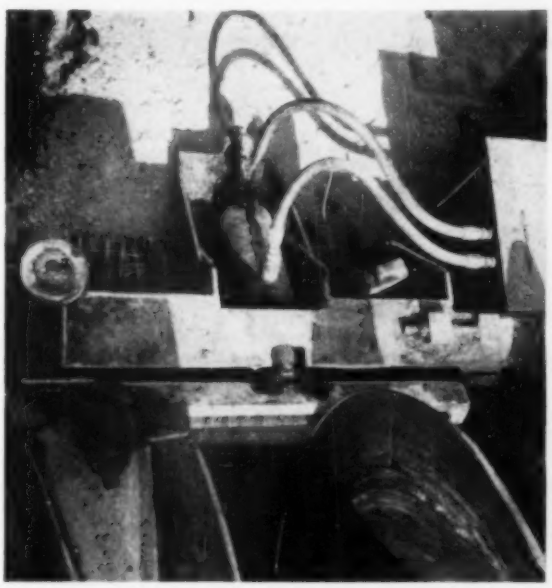
MINING THE COAL

A four-man crew handles actual auger operation. It consists of one auger operator, who controls the auger feed and rotation speed; one auxiliary hydraulic-controls operator, who operates the crane and boom for adding and removing auger sections; and two general laborers who connect and disconnect augers and perform miscellaneous jobs in the pit. A bulldozer works with the auger unit to keep the pit floor clean and move the loaded auger sled to a new setup. Two 10-ton trucks receive coal from the auger via the belt conveyor and deliver it to a nearby stockpile where it is stored

TWO MEN operate auger power units while a third man in crew attaches auger sections to crane.



STEEL-TUBE SLED stores auger sections. Unit is kept parallel to highwall and within easy range of crane.



AUGER-GUIDE ROLLER is held in place by double-acting piston to support cutting head as new hole is started.

AUGER COUPLING is by square shanks locked in place by steel pin with long curved head that hugs round exterior.

Auger Specifications

AUGER SECTIONS
Length, 24 ft
Diameter, 42 in
Cutting head diameter, 44 in
Rotation speed, 50 rpm

MAIN POWER UNIT
165 hp General Motors diesel, Model 6031C

AUXILIARY POWER UNIT
109 hp Ford gasoline engine

TRANSMISSION
Cotta, Model G-2-U-500
Rockford 14-in clutch

HYDRAULIC MOTORS
One 3-in, main pump
One 3-in, auger hoist
One 3-in, auger boom
One 1-in, auger swing

HYDRAULIC PUMPS
One 3-in, main carriage
Two 1-in, auxiliary system

SPEED REDUCERS
Main carriage—cone drive, 30:1 ratio; 9.79 hp @1,200 rpm
Auger hoist—cone drive, 20:1 ratio; speed, 870 rpm
Boom hoist—cone drive, 50:1 ratio
Boom swing—cone drive, 30:1 ratio

TYPICAL STRIP PIT being auger-mined by Cleghorn. Auger can operate in 36-ft pit and is ready to go to work after some minor cleanup work in the area.

DRY LUMP COAL from auger is loaded into trucks for delivery to stockpile Each truck can hold the coal produced from drilling one auger section.

on days the tipple is not operating. The 1½-yd shovel loads coal from the stockpile into hired trucks that carry it 5 mi to the tipple.

The 42-in auger, equipped with a 44-in cutting head, delivers coal to a Barber-Greene combination chain and 30-in belt elevating conveyor, which discharges into trucks. The auger rotates at a speed of 50 rpm and can be fed into the coal at any rate between 0 and 24 fpm, depending on the hardness of the coal or presence of impurities. Under normal conditions the unit drills 50 to 70 tons of coal per hour, or one 170-ft hole. There is no lost time because of truck changeout because each truck can hold the coal produced from one 24-ft auger section and an empty can be in position by the time an auger section is added.

The lead auger has a barrel-type 44-in cutting head, in the center of which is a 3-in-square by 14-in breaker shank, the end of which is equipped with carbide bits to aid in coal breaking. About the periphery of the cutting head are carbide bits that do the heavy-duty boring. Kennametal U8 and Firthite C8 mining-machine bits are used for this job. On the outside of the barrel are screw threads that carry cuttings on the outside of the barrel back to the main auger.

Auger sections are 24 ft long and each yields slightly over 10 tons. Augers have a 24-in pitch and are machine-welded to 10-in-diameter steel tube.

MOVING THE AUGER

Moving the 28-ton machine after the augers have been retracted is done easily and rapidly by two hydraulic moving cylinders incorporated in the auger frame. These units are attached to the auger frame at opposite ends of the machine and each terminates on an 8-inx22-ft skid beneath the frame. Each of the 6-in cylinders has a 4-ft stroke and can be controlled individually from the auxiliary hydraulic system. Before the auger is moved, the four vertical leveling jacks mounted at the corners of the machine are completely closed, permitting the auger frame to rest on the skids. The combination flight and conveyor belt unit is pulled to the new hole by the bulldozer. Auger sections are stored in a sled fabricated from steel tubing.

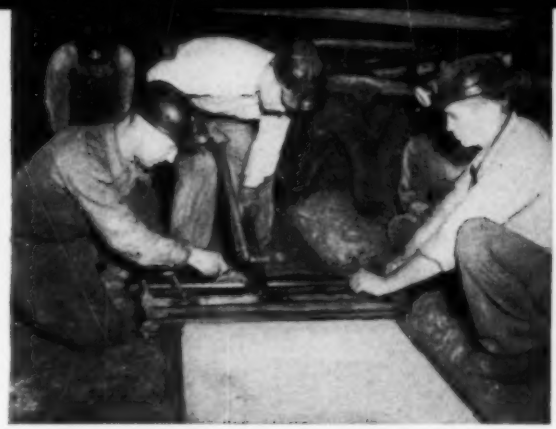
The four 6½x36-in independently controlled leveling jacks support the machine during drilling and also are used to align the unit with the dip of the coal bed when the unit is in drilling position.

In starting a new hole, the lead auger is placed against the coal and supported at the cutting head by an auger guide, which is designed to help the auger make a fast, easy entrance. The guide consists of two rollers, one stationary and one movable, mounted on opposite sides of the auger carriage. The movable roller is held in place against the cutting head by a double-acting hydraulic piston when a new hole is started. When the auger has advanced 12 to 24 in, the movable roller is retracted and the auger speed is stepped up to normal cutting rate.

After the auger has advanced 24 ft, the section is disconnected from the drive chuck and the power unit is retracted to the rear of the unit while another section is being picked up by the crane and lowered to position in the carriage. When a hole has been completed, augers are stored on the steel sled which is always placed adjacent to the augering unit.

TRANSFERRING TO NEW PIT

When augering has been completed on a tract of stripped land, the unit is disassembled for transportation to a new site. It can be readied for moving in one day and reassembled for production at a new site in another. The chain conveyor of the chain-and-belt combination is hauled in a dump truck and the rubber-tire-mounted belt conveyor is towed to the new location. A set of dual wheels is placed under the cutting end of the drill chassis, the crane and two rear leveling jacks are removed and a truck tractor unit is backed under the rear end. The auger is moved with the same ease as a large truck. The auger-storage sled is loaded onto a trailer with augers intact and hauled to the new site in one trip.



STEP 1 (left)—Four pans have been removed, the frayed ends of the bottom belt run have been cut, and taperpointed hooks (left) are being loaded into splicing machine.

STEP 2 (right)—Splicing machine places hooks in belt.

STEP 3 (left)—Troughing idler bolted over belt serves as a clamp in reconnecting the top run with tackle plus use of conveyor drive.

STEP 4 (right)—Tackle draws ends of top run together for inserting wound-wire spindle in splice.

Belt Splicing Under Pressure

THE VALUE of periodic inspection, omission of which for only one day, even though for good reason, was brought out in a belt break at a most inopportune time during a recent mine trip by a *Coal Age* editor. At the same time, it provided one of the rare opportunities for observing, photographing and timing a splicing job. Even though the break was in the under-run, the mine delay was only 55 min. The splice was made between 6 and 7 am in Mary Gail No. 3 mine of the Mary Gail Coal Co., near Hyden, Leslie County, Ky. The preceding supply shift had been short-handed by a man being off because of illness. As a result, time was not available for giving the belt the usual inspection.

The day shift, which starts at 6 am at this mine, was riding in on the belts when the second section of the main-line belt, 30 in, 1,900 ft long, pulled in two in the under-run at a point 300 ft inby the drive. The transfer point at this drive is 600 ft inby the portal. Therefore the materials to make the splice had to be brought in 600 ft on the first section of the main belt and then carried 300 ft to the splice location.

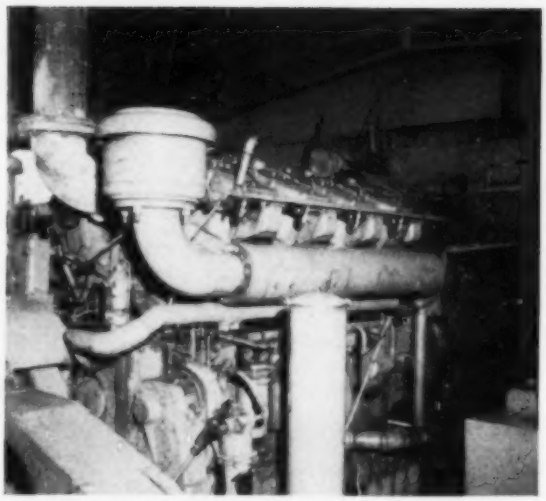
The first move was to dispatch a man to the outside to bring in a Hayden fastening machine, tackle and incidental tools. Plenty of men were available to work on the job. The wound-wire spindle was pulled from a Hayden splice in the top run at a point near the break and about 75 ft of the top-run belting was rolled back out of the way. Four pans were taken out of the Joy conveyor and leaned back against the rib. Next the ends at the belt break were squared and cut. Meantime the fastening machine had been loaded with the taper-pointed Hayden hooks.

After the hooks were applied to the two ends of the belt and the wound-wire spindle was put in to join the ends, the four pans were reassembled into the conveyor. Meantime, two men had taken off a troughing idler at a point immediately inby the splicing location, placed it on top of the belt and rebolted it to the pan, thus anchoring the upper run of the belt.

To recouple the upper run of the belt, clamps were applied near the ends and tackle was attached between them. While a number of men pulled on the tackle rope the drive motor of the conveyor was inched ahead, thus taking the slack out of the belt and allowing insertion of the wound wire spindle.

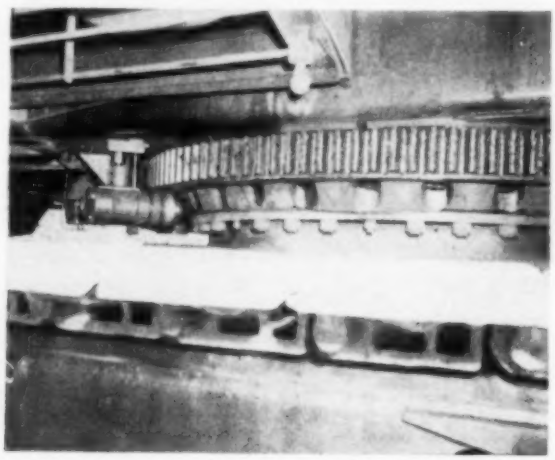
With removal of the clamp to which the tackle was attached and replacement of the troughing idler that served as a clamp, the job was done. Total delay resulting from the belt break was less than 1 hr.

TUBULAR ALLOY-STEEL BOOM, 130 ft long, combines light weight and strength. Weight is only 9,600 lb.

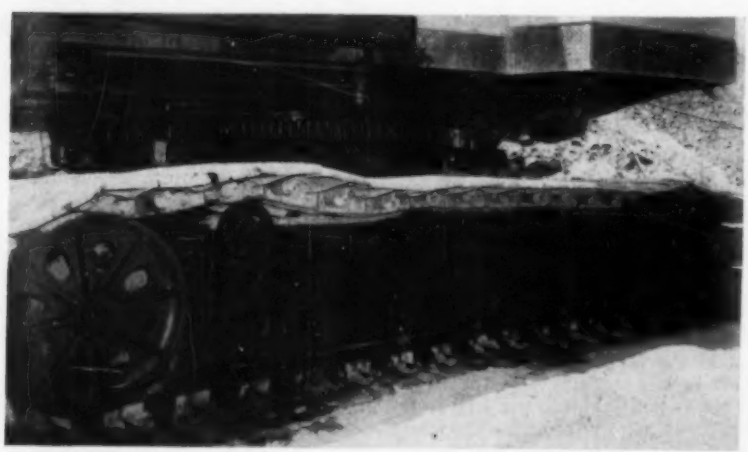


POWER UNIT for new 8-cu-yd dragline is 8-cylinder diesel engine that delivers 625 hp at 900 rpm.

SPECIAL-DESIGN bucket of alloy steel decreases dead-weight on boom and permits more payload per pass.



HOOK ROLLERS with equalizing action fasten the lower machinery to the upper section.



TWO CRAWLERS, each 29 ft long, support unit. Bearing area is 37,000 sq in and ground pressure is 17.0 psi.

AUXILIARY POWER UNIT stands ready to supply emergency lighting.

10 YR MORE LIFE for Wingert stripping properties is the result of purchase of this new-design 8-yd dragline. New unit strips to 80-ft bank and can work pit 120 ft wide.

Raising Strip-Mine Life

New-design 8-yd dragline permits Wingert Contracting to strip to 80 ft and rework areas previously stopped at the 53-ft limit. New unit adds 10 yr to pit life of present properties.

By A. E. FLOWERS
Associate Editor, Coal Age

EFFICIENT REMOVAL of 80 ft of overburden to recover 38 in of coal is achieved by a new-design 8-cu-yd dragline installed early this year at the Lloyd No. 3 mine of the Wingert Contracting Co., Butler, Pa. The new unit is reported to be the world's largest mounted on a single pair of crawlers. Adding 10 yr of stripping life to the present properties, the new dragline handles the additional overburden at no greater cost than a previous 4-yd unit working to a 53-ft highwall.

In 1948, Wingert Contracting, under the leadership of Lloyd I. Wingert, president and principal owner, reviewed their property and reestimated the coal reserves available within the 53-ft stripping range. Figures indicated that they were limited and that larger and more efficient equipment would be needed to go to higher banks if production was to be maintained at the same level in the future. As a result, in June, 1948, management called in engineers from the Harnischfeger Corp. and the Electric Steel Mfg. Co. to discuss the possibility of doubling the capacity of the original stripping unit—a P&H 1055 dragline with 4-yd bucket.

In addition, Wingert was interested in having the new unit mounted on two crawlers to permit easy maneuvering and traveling on narrow roads. P&H engineers went to work on the drag unit and the Electric Steel Mfg. Co. set out to design a lightweight alloy-steel bucket. Preliminary plans submitted by the manufacturers indicated that the machine and bucket could be made. Consequently, on June 25, 1950, Wingert placed an order for a 8-cu-yd unit to incorporate all-Magnetorque clutches and to be mounted on two crawlers.

Erection began Nov. 4, 1952, when the first of 12 carloads of machinery arrived on the property. The unit went into full production in a test area in January, 1953, and since then Wingert management reports that it has surpassed anticipated performance. It is uncovering as much coal while moving 80 ft of cover as the old unit did while working to a 53-ft bank.

Outstanding features of the new dragline are: Magnetorque control for all operating motions; a 130-ft alloy-steel tubular boom that combines light weight with strength; a specially designed lightweight alloy-steel bucket; and a high-speed operating cycle. Total weight of the unit with bucket is 630,000 lb. The drag can be operated with the boom in a lower position than normal for dragline operation. In relatively level areas it can work a pit 120 ft wide.

With a capacity to handle over ½ million cu yd per month on a 24-hr-per-day basis, Wingert management feels confident that the unit will average well over 400,000 yd per month in normal working conditions. This capacity is based on the fact that the unit can make a complete cycle—load, hoist, swing, dump and return—in 41 sec.

Recently, bucket capacity has been increased 1.11 cu yd by welding sideboards to the original bucket, thus upping capacity to over 9 cu yd. Dragline operators report no apparent changes in operating characteristics since the larger bucket has been in

INITIAL CUT to 35-ft highwall is job for dozer and shovel. Dozer moves up to 20 ft of dirt.

SECOND CUT to a 53-ft bank is handled by a 4-yd dragline with 80-ft boom. Soft overburden is not shot.

TYPICAL 80-FT HIGHWALL left after new dragline reworks areas formerly stripped to 53-ft bank.

COMBINATION SWEEPER AND PUMPER handles final coal cleaning. Pump mounted at rear is used to drain pits.

Facts About the New Dragline

POWER UNIT

Cooper Bessemer FV8, 8-cylinder diesel, 625 hp at 900 rpm. Unit has self starter consisting of an auxiliary engine and motor-driven air compressor.

UPPER MACHINERY

Full Magnetorque drive permits power transmission without any mechanical linkage for all operating motions. Engine power is transmitted directly to the Magnetorque units handling the various motions. The outer member, with annular coils, revolves at constant speed. Speed of the inner member is operator controlled by regulation of the exciting current supplied to the annular coils. Absence of friction clutches eliminates maintenance on bands and linings. Operation is smooth and easy and there are no shock loads.

Other construction features are: all-welded rolled alloy-steel construction; antifriction bearings throughout; all heat-treated gearing; free wheeling on hoist and drag for casting bucket.

LOWER MACHINERY

Among the outstanding features of the lower machinery are: a one-piece car body of all welded construction; a live roller circle; six hook rollers with equalizing action; 60-in shoes; totally enclosed gearing running in an oil bath; lower crawler rollers of heat-treated cast-alloy steel; and air brakes.

CRAWLERS

Length	29 ft
Sprocket centers	24 ft
Overall width	22 ft 6 in
No. crawler shoes	84
Turning radius	24 ft 9 in
Drive	Chain
Pitch of shoes	17 in
No. of lower rollers	10 each frame
Diameter of rollers	18 in
Bearing area	37,000 sq in
Ground pressure	17.0 psi

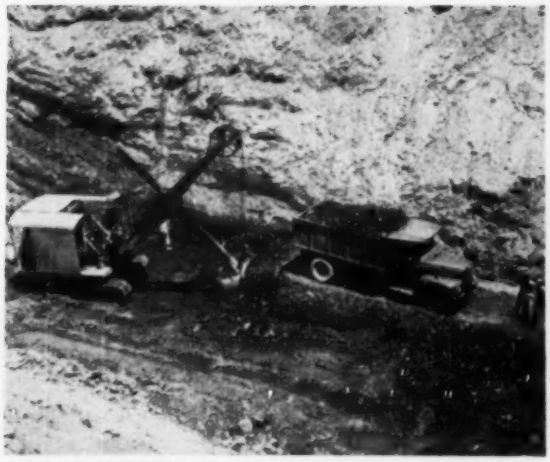
CABLE DATA

Hoist	1⅜ in
Digging	1⅝ in
Boom hoist	1 in
Main susp.	2, 1¾ in
Int. susp.	2, ⅞ in

OPERATING DATA

Hoist-line speed	220 fpm
Digging-line speed	180 fpm
Hoist-line pull	90,000 lb
Digging-line pull	110,000 lb
Rotating speed	2.75 rpm
Travel speed	0.56 mph
Boom-point sheave P. D.	42 in
Boom-hoist line speed	82 fpm
Boom length	130 ft

FINAL CUT removing up to 80 ft of unshot shale to recover 38-in coal is job of new two-crawler unit.



COAL LOADING is done by a 1¼-yd diesel shovel. Soft fireclay bottom requires haulage on coal.

FUEL TRUCK in foreground has two compartments for fuels. Trailer tank in rear serves as portable storage tank.

HAULAGE TO TIPPLE is by hired trucks. Bin at top of ramp holds 30 tons and permits uniform feed to tipple.

service. Wingert management anticipates an increase of about 35,000 cu yd in monthly output as a result of increasing bucket capacity.

Increasingly longer cable life has been experienced with addition of each new cable as the dragline operator gains more experience. Drag cable that was guaranteed for 600 hr has been giving an average of 650 hr of service and the present cable has been in service for 845 hr.

STRIPPING CONDITIONS

Wingert began stripping operations in Pennsylvania in 1937 and since March, 1939, has been exclusively in Clarion County, near Sligo, about 75 mi northeast of Pittsburgh. Highwalls of 30 ft were considered the economic limit in the early days. However, in 1945, purchase of larger equipment made possible stripping up to 53 ft of overburden. Now, with the new drag in operation, 80-ft highwalls are considered standard.

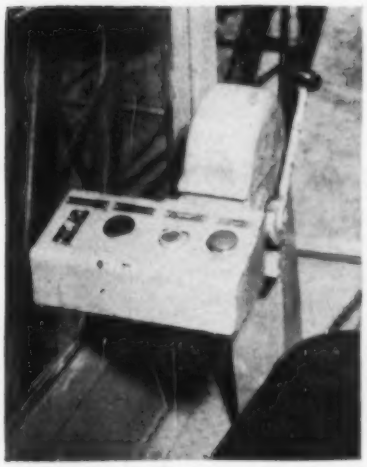
At present, two pits, Lloyd No. 3 and Lloyd No. 4, are the sources of coal produced from the Lower Kittanning seam ranging from 36 to 54 in in thickness and averaging 38 in. Both pits are within 10 mi of the tipple, located 1 mi southeast of Sligo, on the Sligo Branch of the Pennsylvania R. R.

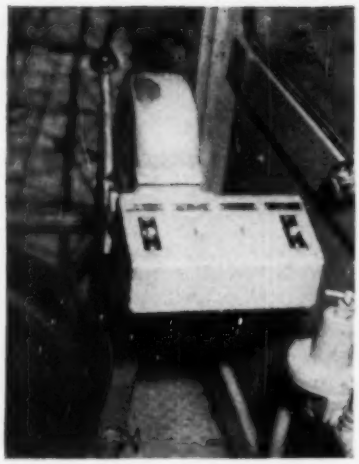
Overburden on the coal consists of soft shale that rarely requires shooting. Coal also is loaded without shooting. Comparatively soft fireclay underlies the coal in both pits and, therefore, haulage is on the top of the coal.

STRIPPING METHODS

Initial strip cuts are made by a Lima 1201 2½-yd diesel-powered shovel and an Allis-Chalmers HD 20 bulldozer unit. This team uncovers coal to a 35-ft highwall as the first step in mining to the 80-ft bank. The bulldozer works ahead of the shovel at right angles to the outcrop and pushes soft, loose dirt to a point below the outcrop. Cuts up to 10 and 12 ft deep are common and sometimes run up to 20 ft before the Lima moves in and removes the shale covering the coal. When sufficient coal is uncovered, the Lima is used as a coal-loading unit while the bulldozer continues cutting the loose cover down and performing utility work in the pit.

After an area has been mined to the 35-ft bank, the original P&H 1055 4-yd unit, with an 80-ft boom, takes over and strips to a 53-ft highwall. This unit, powered by a GMC 200-hp diesel operating at 1,800 rpm, recently has been completely rebuilt in accordance with company policy of keeping





FINGERTIP CONTROL of all dragline motions is possible from two control boxes mounted at opposite sides of the operator's seat.

PRESIDENT and principal owner, Lloyd I. Wingert, has been active in the stripping business since 1937.

VICE PRESIDENT William L. Wingert, maintains field office near strip pits and takes an active part in operations.

all equipment in top operating condition by regular systematic rebuilding. Frequent painting of equipment is practiced to stimulate good housekeeping and neatness.

The 1055 starts stripping by working parallel to the 35-ft bank at the 53-ft cover line. The first step is making a narrow vertical cut of bucket-width down to the coal seam. It then works toward the edge of the 35-ft bank, dragging from the narrow cut toward the spoil and depositing the new spoil in the old pit. This continues until all the cover has been removed along the length of the narrow opening cut, after which a new opening cut is made and the cycle repeated.

A Caterpillar D8 bulldozer performs utility work for the 1055, levels spoil areas and removes coarse dirt from on top of the coal. A Galion road-grader removes the finer material and final cleaning is done by an International T14 rubber-tire-mounted combination sweeper and pumper unit.

The new P&H 1855 is presently assigned to the Lloyd No. 3 mine where it is reworking areas previously stripped to a 53-ft bank. A Caterpillar D8 bulldozer, working ahead of the dragline, prepares a working bench above the 53-ft highwall and performs additional duties, such as, roadbuilding, coal cleaning and leveling of spoil banks.

A Lorain 75 shovel, equipped with a 1¼-yd dipper, loads coal into hired trucks that haul it a maximum distance of 10 mi to the improved 200-tph tipple. The tipple was described previously in an article on the Wingert properties appearing in *Coal Age*, April, 1948. There the trucks dump into a 30-ton bin from which R-O-M is fed via a Syntron variable feeder to the picking belt. Four men remove rock and impurities before the coal passes either to a recently installed American Pulverizer hammermill used to make ¾x0 or to a Scott Machinery Co. 24x30 double-roll crusher making a 2x0 product. The crusher product passes to a loading chute and is delivered to railroad cars.

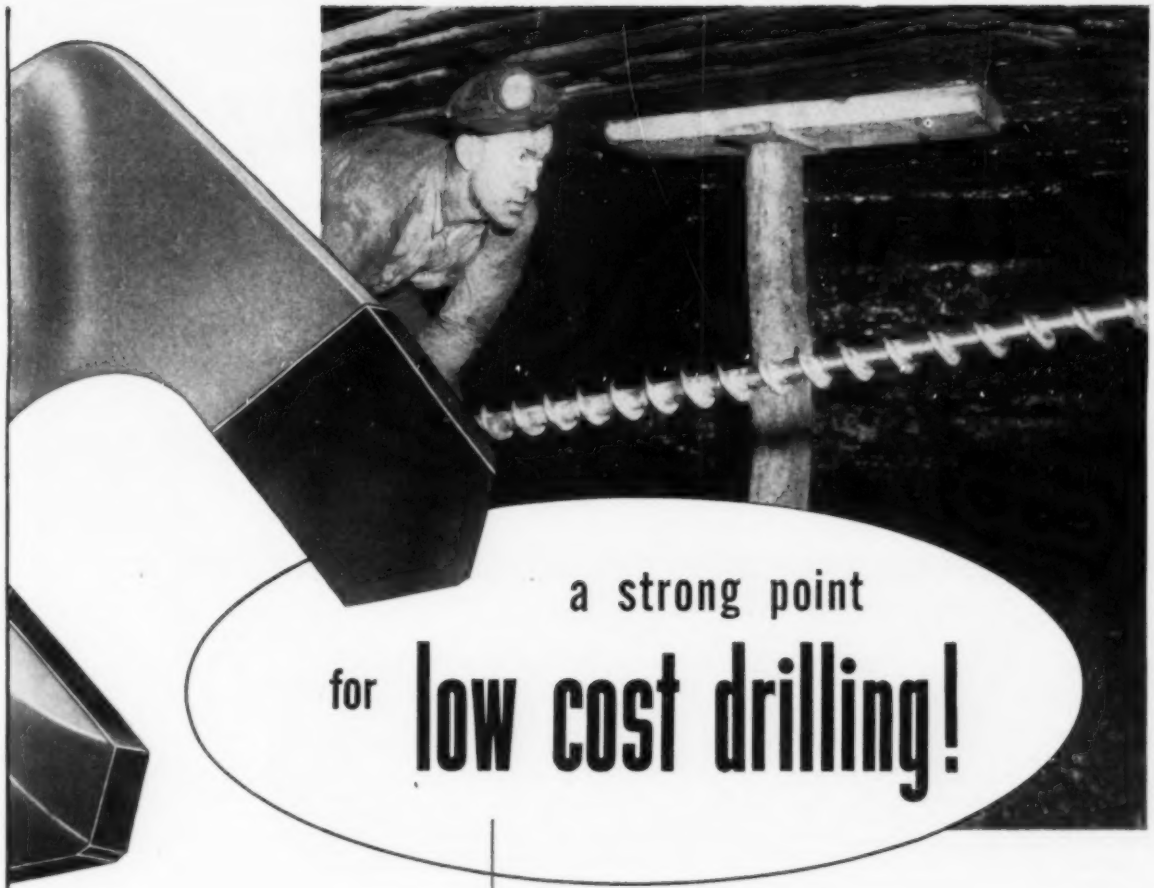
In addition to installing a new hammermill since 1948, Wingert Contracting has added facilities for freezeproofing coal in cold weather. Calcium chloride from a conical bin is fed to the picking belt by an adjustable feeder set to add the amount required to assure free-running coal at the destination.

Proper preventive maintenance and bright, neat equipment are No. 1 objectives at Wingert mines. To keep equipment in top operating condition, a combined field office and shop is maintained at a central point in the property. Two truck-mounted welders, one a Hobart 300-amp unit mounted on a Dodge Power Wagon and the other a Lincoln unit mounted on a Willys Jeep, are used to repair units in the field before major trouble develops.

A second Dodge Power-Wagon chassis is fitted with a compartmented fuel tank. One compartment holds 55 gal of gasoline and the other 600 gal of fuel oil. A rack on top of the tank holds a group of 5-gal cans containing various oils and greases.

Fast refueling is accomplished by power pumping from the supply truck to the strip units. A gasoline-powered Marlow centrifugal pump, mounted on the fuel truck, delivers 100 gpm of fuel with no spillage. A two-compartment 4,000-gal semitrailer fuel tank is permanently parked at the field-service garage and is used to store fuel delivered direct from the refinery. From here it is pumped into the field fuel truck for delivery to the various diesel-powered units.

In direct charge of all strip operations is William L. Wingert, vice president and son of Lloyd I. Wingert, president. He maintains an office in the field and spends considerable time each day in the working areas. Arthur Johns is superintendent and Merle Furlong is in charge of shop maintenance. The Pittsburgh & Ohio Coal Co., Cleveland, has been exclusive sales agent for Wingert coals for the past 12 yr.



a strong point for low cost drilling!

12,000 feet of drilling

Kennametal D-1-3/8" Bit delivered this outstanding footage in Coshocton County, Ohio. Bit was reground 40 times, still retained its hard Kennametal Tips.

37 full drilling shifts

Kennametal D-2" Bit gave this superior service in the Pittsburgh 8 Seam, West Virginia. Reground 37 times — an average of once per shift.

Point is: Hard Kennametal tungsten carbide, unequalled for shock and wear resistance, is an important partner in low cost drilling.

Kennametal drill bits stay sharp longer, are good for 3000 to 7000 feet under normal conditions. Bit reconditioning costs are lower. Substantial savings are made in armature repairs and drill maintenance. Head design assures faster chipping action, provides maximum freedom for cuttings to pass into auger — increased rates of penetration result.

Any of your rotary drilling problems can be solved with one of the 39 styles of Kennametal drill bits. They are sold by veteran mining men who will gladly demonstrate them for you. Call in your Kennametal representative anytime, without obligation.

Look for the name of your Kennametal Representative in the yellow section of your phone book, or on the back of your Kennametal Price Book — or, write direct.

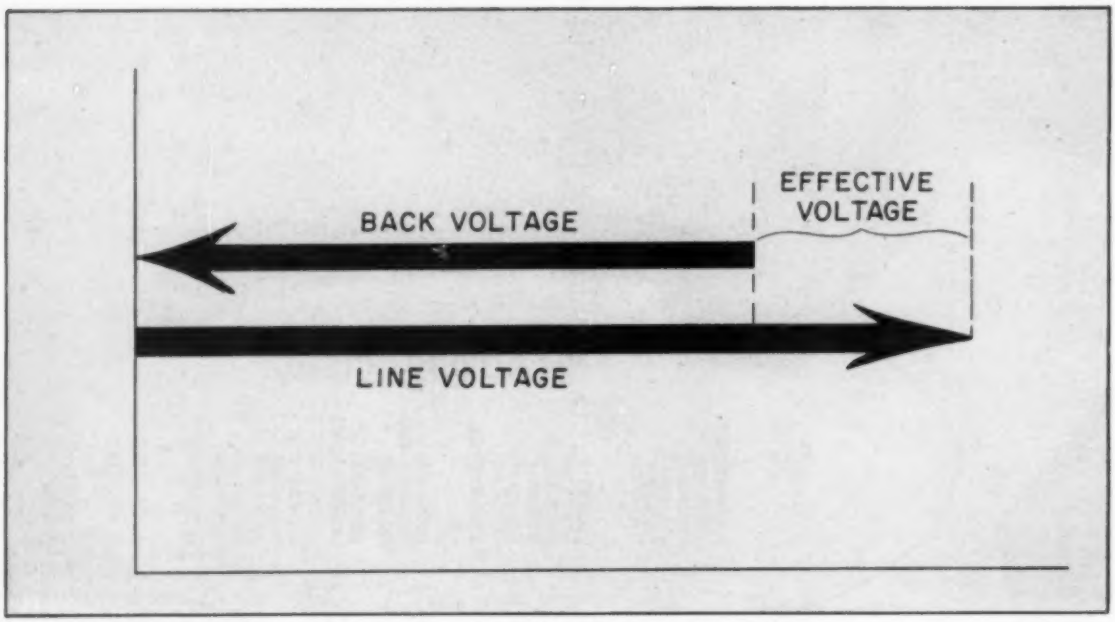
World's Largest Manufacturer of Tungsten-Carbide

Drill Bits, Cutter Bits, Roof Bits, Strip Bits

KENNAMETAL®

KENNAMETAL INC., MINING TOOL DIVISION
BEDFORD, PA.
General Offices and Main Plant at Latrobe, Pa.

Foremen's Forum



EFFECTIVE VOLTAGE, that relatively small surplus of line voltage over back voltage, is the only pressure driving current through the armature of a rotating motor. Call upon your "effective voltage" in facing the pressures of 1954.

Pressure and Resistance

Do not live in the false hope that 1954 will bring a lightening of the pressures of modern living . . .

Live in the healthy knowledge that pressure is normal—we would explode without it . . .

IN ENTERING THIS NEW YEAR, we can be absolutely certain of only one promise 1954 holds for us. That is the promise, always fulfilled, that the mental, moral and physical pressures under which we work and live will not become markedly lighter. In fact, the pressures may even increase. This may seem like a pessimistic note upon which to begin a new year, but perhaps if we consider the subject for a while, we may find these pressures are necessary to our growth and progress. Let's look into it.

One of the best ways of launching into a somewhat abstract discussion, as this may prove to be, is to set up some readily understood examples which will illustrate the more abstract considerations.

We're talking about the pressures under which we live and the resistance we meet whenever we set out to do something. Good examples can be drawn from electricity, mechanics and human relationships, three subjects familiar to most of us.

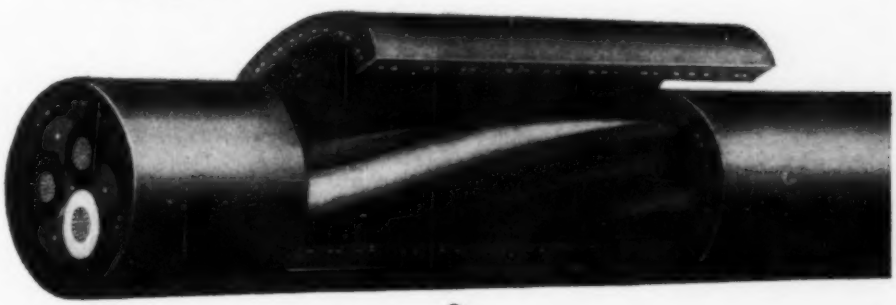
Take the case of a DC motor. If we connect such a motor to a power line, the motor begins to rotate under the influence of line voltage. But at the instant the armature begins to turn over, the motor takes on the characteristics of a generator. The result is a generated voltage within the motor which opposes the line voltage. We call it counter-electromotive force or "back" voltage.

As the motor picks up speed, the back voltage increases in magnitude until it very nearly reaches the value of the line voltage when the motor is operating at rated speed. It may reach a value as high as 90% of the line voltage; then only the 10% surplus of line voltage over back voltage is effective in driving current through the armature windings to cause the desired rotation.

At first glance, it might appear that among all electrical phenomena this crazy back voltage is the most wasteful and useless and exasperating. But that isn't true. Back voltage is a balancing influence. Electrical machinery, as we know it today, could not exist in the absence of back voltage since armatures large enough to carry the current resulting from full line voltage would be unwieldly in most modern motor applications. What appears to be a useless opposing pressure actually is a necessity in the proper operation of a DC motor.

Consider this example from the science of mechanics. A loaded mine car stands on a level track. It is completely static, and unaware of the existence of any forces. But at the instant you begin to push the car, it resists your effort with its dead weight and inertia, and all the fric-

TAKE A GOOD LOOK!



When a skilled mechanic looks for trouble, he lifts the hood. And an engineer knows, too, that looking beneath the protective sheath is a good check on construction quality in mining machinery cable. The Hazaprene ZBF sheath on all Hazacords is tough and highly resistant to flame, oil, sun, water and acids. Yet the Hazacord components on the inside are equally important for long service life.

Take a look inside. First are the conductors, specially coated to resist corrosion. The large number and short lay of the strands plus the short lay of the insulated conductors provide an easy-to-handle flexibility.

Second, extra service life and protection are assured by Hazard's tough, resilient, heat-resisting rubber insulation.

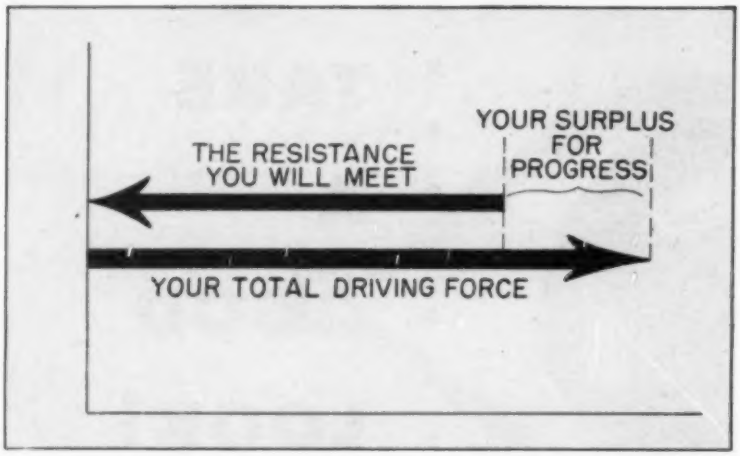
Third, unlike fibrous fillers which sometimes act like a wick, Hazacord fillers are made of Hazaprene and will not absorb moisture. This construction provides a tight-fitting, compact structure which will resist the severest mechanical abuse.

Fourth, all components are specially "lubricated" to provide a working assembly that insures maximum flexibility.

Inside and out, Hazacord mining machine cables are constructed to assure a minimum of trouble and a maximum of dependability. Write for the Hazard Mining Catalog. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pennsylvania.

HAZARD *insulated cables*

1959



YOUR SURPLUS FOR PROGRESS, like effective voltage, is that little bit of extra effort you can still exert after meeting and overcoming resistance.

tion it can summon. You've got to push to get it going and you must continue to push to keep it moving. It takes force, or pressure, to convert a static system into a dynamic system. And the force, which is applied to achieve a desirable end, invariably will meet resistance. As noted in the example explaining back voltage, this mechanical resistance also is necessary. Without it the air would be full of lethal objects, flying about at the slightest provocation. We would be unable to control the motion or distribution of objects or materials.

Take an example in the field of human relations. As you sit here reading this piece, you feel no particular resistance to anything, except perhaps the words and ideas on this page you're reading. But let an equipment salesman walk through that door with a new product to offer and immediately your sales resistance is aroused. He is acting to achieve a goal, the sale of his product, and you resist his effort—every time. He'll make the sale if he convinces you of the value of his product and he won't sell you if he doesn't convince you.

At any rate, your resistance benefits the salesman. He will of course be pleased and rewarded if you buy. If you don't buy, he will be led to sharpen his sales presentation for his next prospective customer.

These three examples demonstrate five major points, as follows:

1. Every action generates a reaction.
2. The resulting reaction is necessary in maintaining balance in the system upon which the initial action was applied.
3. Only that relatively small surplus of energy remaining after the reaction is met and overcome is effective in promoting the desired progress.
4. There is no sensible evidence of pressure or resistance, action or reaction, in an absolute static system or in a perfect vacuum.
5. Therefore, a static system is lifeless and a vacuum is dead space.

Now let's explore these five points to turn up some thoughts for mine supervisors and the rest of us and to promote healthy, practical attitudes for living in 1954.

Many of us fail to realize the universal truth in the first point. For example, we draw up plans for a course of action, we set the wheels in motion to achieve the goal of our plans, then we are surprised and shocked to find that others object to our plans, our methods or our goal. We had not expected opposition to actions that seemed so reasonable to us.

Such resistance is as normal as blueberry pie, however, and in our future contacts with people we will more easily maintain our mental equilibrium if we realize beforehand that our ideas and plans will not move freely toward the ends we desire. We must expect these plans and ideas to be resisted, criticized and tested as a matter of course. We have only to realize that every action generates a reaction.

The second of our five points supplements the first. Resistance to our ideas and actions not only is automatic but also necessary.

Imagine what the world would be like if all hare-brained ideas met no resistance. True, some foolish ideas do pass through the sieve of criticism, but sooner or later a better one is offered which recaptures the minds of men. If there was no automatic resistance, we would truly be lost in a welter of schemes; we would mill around with no hope of progress. We move forward on good ideas that can safely run the gantlet of resistance.

Point No. 3 is mighty important. This is the one which separates the men from the boys. The man who is experienced in formulating good ideas and in promoting them to a desired conclusion fully understands that he must expend a lot of effort merely to overcome the automatic resistance. He sees no tangible results from the expenditure of this effort. But he further understands that just a little more effort will put his idea over the top. In other words, he understands the human applications of the terms line voltage, back voltage and effective voltage. He's the man with a surplus of effective voltage after he meets the challenge of back voltage.

On the other hand, the inexperienced and the fainthearted appear to lack an understanding of this principle. They quit in the face of resistance. They "knuckle under" when resistance rears its necessary head. It's the old story of Faint Heart never winning Fair Lady. It would be difficult to estimate the number of good ideas which, for this reason alone, have never reached fulfillment.

Point No. 4 carries the thought that if there is no pressure and no resistance then nothing is happening . . . shapeless, shimmering jelly.

Point No. 5 is a declaration that living, breathing men can't exist in a static system. We would explode in a vacuum. Total relief of pressure is more dangerous than mounting pressure, insofar as human progress is concerned.

Here's the commercial. Here are the guides we offer you as you fare forth into 1954.

- **Ponder these matters** until you finally realize that a life without pressure is unattainable this side of Utopia.

- **Pressure does not destroy people,** but living in the false hope of a life without pressure does delude some to the point of crackup.

- **Be wary of those** who offer you a relief of pressure. If they remove one pressure, they may replace it with another pressure that will be more difficult to bear. Remember, we explode in a vacuum.

- **Don't let this presentation** of facts dismay you to the point of lying prone before the steamroller of 1954's problems. Tackle each problem as it presents itself to you. Solve each problem to the best of your ability, then immediately get ready for the next one. The maintenance of your mental equilibrium and the strengthening of your moral fiber demand this approach to modern living.

- **Give similar concern** to the problems and pressures of others. You can forget a lot of your own troubles by helping others with theirs.

- **Assume pressure voluntarily.** Wear your mantle of pressure gracefully. Men who leave beneficial marks in life do both.

- **Finally, if the shadowy future** holds forces that are bound to destroy you, face the future in happy resignation to the fact that no one guarantees you safe passage through this life. Even some early Christians, who deserved a break if anyone does, were fed to the Coliseum lions, but they didn't bemoan their fate because they knew the secrets of living under pressure.

True to our thesis, we invite your resistance to and criticism of these ideas.

A FAIR OFFER

If you will put a Jenkins Valve, recommended for your particular service, on the worst place you can find — where you cannot keep other valves tight — and if it is not perfectly tight or it does not hold steam, oil, acids, water or other fluids longer than any other valve, you may return it and your money will be refunded.

Jenkins Bros

A FAIR OFFER THAT HAS BEEN IN EFFECT SINCE 1869

JENKINS VALVES

LOOK FOR THE DIAMOND MARK

SINCE 1864 TRADE JENKINS MARK

Jenkins Bros

This famous "Fair Offer" has been published at frequent intervals for the past 84 years. It can be repeated, again and again, only because all Jenkins Valves measure up to its sincere pledge of exceptional dependability.

Despite their *extra value*, proved by countless economy records in every type of service, *you pay no more* for Jenkins Valves. Jenkins Bros., 100 Park Ave., New York 17.

A MESSAGE TO AMERICAN INDUSTRY • ONE OF A SERIES

No Room for Industrial Complacency

Do you believe that American industry is equipped with remarkably up-to-date and efficient machinery? If you do, you are mistaken. The fact is that a large share of American industry's equipment is ancient, of obsolete design and incapable of attaining the efficiency that is made possible by modern production techniques.

This fact is documented by the Seventh Inventory of Metalworking Equipment, just completed by AMERICAN MACHINIST, a McGraw-Hill publication. In brief, AMERICAN MACHINIST shows that:

1. More than half (56%) of American industry's most basic production equipment—machine tools and metal-forming units—is overage, and much of it is so old that it has very limited usefulness.

2. Since Korea, the situation has become dangerously worse.

Facts vs. Plausible Theory

These conclusions contradict the widely-held impression that America's industrial equipment is in better physical shape than ever before. The prevalence of this impression is not surprising. We, as a nation, have spent about $125 billion for new industrial plant and equipment since World War II. That is more than in any previous period in our history. During 1953, American industry invested $21 billion in new plant and equipment, an all-time high. From this, it would be reasonable to infer that our industrial plant and equipment must be in fine condition.

But the facts do not support that inference with respect to the machine tools and other metalworking equipment that are so crucial to our economy in war and peace. Here are the key findings of the AMERICAN MACHINIST Inventory:

(1) More than one million machine tools—out of a total of less than two million in the metalworking industries—are at least ten years old. Many of these, after day and night operation

during the war years and the recent rush to rearm, are actually much older production-wise than their age in years indicates. In most cases, these machines are unable to produce goods as efficiently as modern equipment can, thus needlessly increasing costs.

(2) Almost one out of five machine tools is more than twenty years old. Most of these machines are so outdated by modern standards that they have little more than scrap value. And an even larger portion of our metal-forming equipment (presses, brakes and shears, bending and straightening machines) has passed the 20-year mark and is beyond normal retirement age.

(3) Two out of three machine tools are of designs predating World War II, though many of them have been built since the war. Thus, two-thirds of our machine tools fail to incorporate the many major postwar improvements in design and operating methods.

(4) Never before has outmoded high-cost equipment been so widely diffused throughout American industry. In every one of fifteen major divisions of metalworking production, more than 45% of the machine tools are at least ten years old.

(5) Not since the depression days of the 1930's has the average age of machine tools risen so rapidly as it has in the past four years. Today, 55% are ten years old or older, compared with 43% just before Korea.

Quality vs. Quantity

Why has the condition of our metalworking equipment been steadily deteriorating since the end of World War II? Part of the explanation lies in the fact that, in the immediate postwar years, production of metalworking equipment lagged behind the production of industrial equipment generally. The larger part of the explanation, however, lies in the tremendous postwar expansion of the American economy. This expansion, which has more than doubled our total industrial capacity, has imposed requirements for metalworking machinery that have been met only by more extensive use of old and obsolete tools. In the critically important field of metalworking, the job of providing up-to-date tools is bigger than it ever has been.

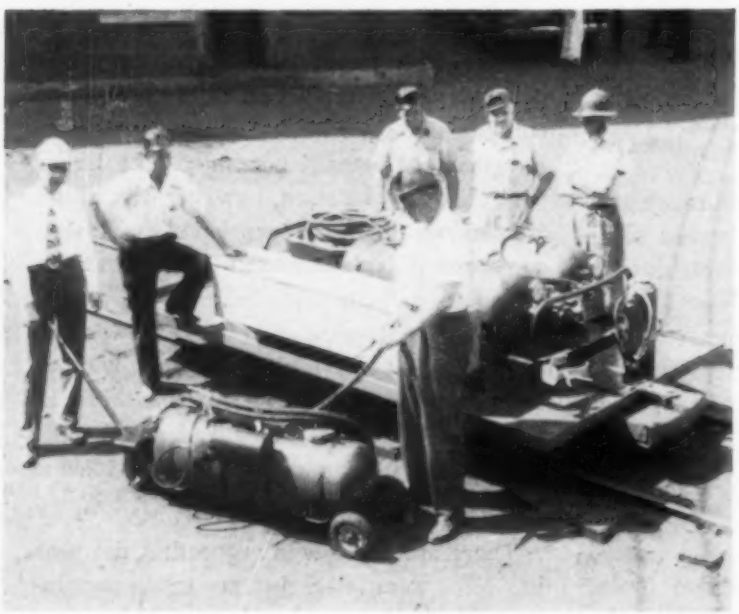
There are those who argue that the time has come to cut back investment in new industrial plant and equipment and divert more of the national income into current consumption. They cite both the great increase in the nation's total industrial capacity since World War II and the fact that some industries now have more than ample producing capacity to meet their needs. But this type of calculation leaves out the *efficiency* of that producing capacity.

The AMERICAN MACHINIST Inventory makes it manifest that in the key field of metalworking we are alarmingly short of first-rate, low-cost producing capacity. If we fail to remedy this situation by speeding the replacement of obsolete tools, it will be at the peril of our prosperity, at the peril of a sustained increase in our standard of living and of our national security.

McGraw-Hill Publishing Company, Inc.

Operating Ideas

Mine-Built Fire Truck a Versatile Unit



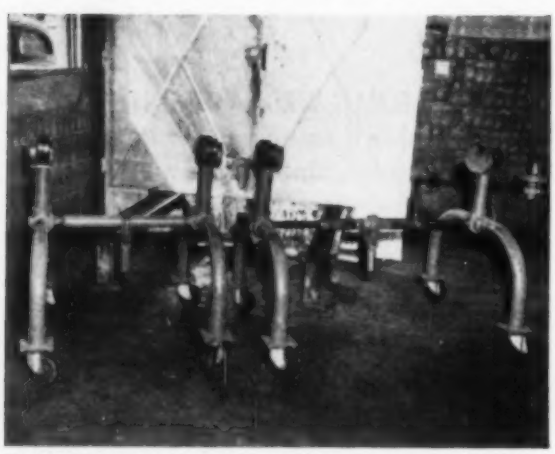
TRACK MOUNTED FIRE CAR developed at the Mulga coal mine is examined by Woodward Iron operating officials: Stanley H. Mooney (left), safety director; A. D. Shoemaker, safety inspector; Troy Glaze, master mechanic; T. H. Kirk, Mulga superintendent; and Fred Ellis, section foreman in the ore division, holding the hose of the demountable portable extinguisher unit.

FIRE-FIGHTING CAR developed and built at the Mulga coal mine of the Woodward Iron Co., Mulga, Ala., carries all the equipment necessary to fight any type of mine fire either underground or on the surface except where live electrical equipment is involved. Mounted on a mine-car body, the unit is normally kept at a central point underground in a clean, well-lighted, cement-block "garage." It can be quickly coupled to any locomotive and moved over mine track to the scene of the fire. To permit its use in areas with low headroom, the car has an over-all height of 30 in.

On the car are three 40-gal units of Karbaloy, two mounted permanently on the metal bed built onto the car body, and the third a portable rubber-tired unit that can be pulled into areas not reached with track. The Karbaloy in the three tanks is expelled by carbon-dioxide carried in separate cylinders under pressure of about 850 to 900 psi. There is a small carbon-dioxide cylinder on the portable unit and a larger tank installed on the fire car. Five sections of 1¼-in hose 75 ft long serve the Karbaloy cylinders.

Standard equipment carried on the car include a roll of brattice cloth kept in a round metal tube; various fire-fighting tools and supplies in a metal tool box; two 30-lb dry-chemical fire extinguishers; and four MSA all-service gas masks. The bed and trucks of the car are painted green, the Karbaloy cylinders red, and the brattice-cloth container and tool box are yellow.

Adjustable Armature Stands Made From Standard Parts



ADJUSTABLE STAND at the left has been contracted for work on shorter armatures; that at the right expanded.

FABRICATED from standard parts, the armature stands used at the Ashland Div. of the National Mine Service Co., Ashland, Ky., are of a new type designed by G. E. Suiter, general manager of that division and of the All-State Div., Logan, W. Va. The stands are quickly adjustable to a wide range of armature lengths and are designed to leave the floor space and center space clear for the feet and legs of a man working on the armature.

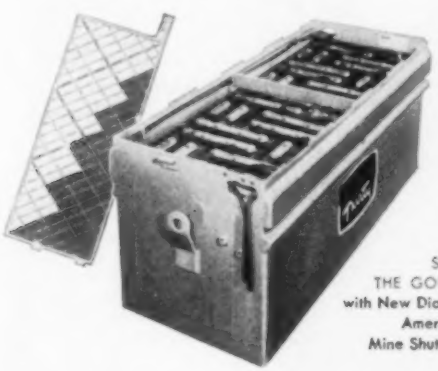
Legs of the armature stand are 2½-in conduit bends. Pipe tees joining the pairs of legs are welded to right- and left-hand threaded rods of jacks from Joy elevators. Operating the jack expands or contracts the stand. Ball bearings mounted at the top of the pedestals carry the armature shaft. The pedestals consist of smaller pipes slipped into the 2½-in risers. Casters are heavy-duty ball-bearing type.

The Ashland plant is specially equipped for reconditioning Joy loading machines, Joy shuttle cars and Joy continuous miners, and serves all the mining territory east of the Mississippi. Mr. Suiter's long and intensive experience with mining machinery is indicated by a directory in the 1922 Proceedings of the West Virginia-Kentucky Association of Mine, Mechanical & Electrical Engineers, listing him at that time as electrical and mechanical engineer for the Winding Gulf Collieries, Winding Gulf, W. Va.

HIGH-LEVEL PERFORMANCE

THANKS TO BATTERY POWER!

Use battery-powered shuttle cars and you've got high-level performance for low-cost, SAFE, underground hauling. Battery cars have no trailing connections. They can travel alternate routes in case of emergency. They have no passing problems. They travel faster, farther and move more coal at lower cost per ton. There's nothing like high performance battery power to maintain schedules . . . there's *no* mine shuttle car or locomotive power like *Gould* power!



Specify
THE GOULD "THIRTY"
with New Diamond "Z" Grids—
America's Finest
Mine Shuttle Car Battery

GOULD *INDUSTRIAL BATTERIES*

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.

Always Use Gould-National Automobile and Truck Batteries

©1953 Gould-National Batteries, Inc.

How to Cut Trolley-Line Costs

These eight mine-tested steps for cutting costs of trolley-wire installation, maintenance and wear are suggested by the Ohio Brass Co., as adapted from the company's publication, *Haulageways*.

1. Save Power With More Taps

One of the most important factors in efficient power distribution is the use of taps from feeder to trolley at least every 500 ft, and considerably closer if possible, depending on the quantity of copper used and the loads carried. Failure to provide sufficient tie-ins between the positive feeder and the trolley wire, or between negative feeder and rail, can result in an excessive voltage drop and large yearly power losses.

3. Reduce Overhead Supports

Wherever the roof is hard enough to support the combined weights of trolley and feeder, dual overhead supports can be profitably used, thus requiring only half the usual number of supports and saving up to 44% in fitting costs. Mines that depend on expansion-bolt supports can save a lot on labor, too. The difference between drilling 350 and 700 bolt holes in hard roof for 1 mi of overhead indicate the possible savings.

2. Cushion Wire for Less Wear

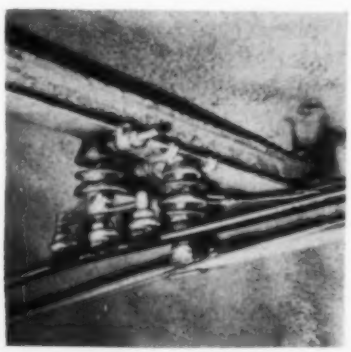
To "cushion" semicatenary overhead, support the cable in feeder slings attached to standard hangers, and suspend the trolley wire directly from the cable with combination feeder clamps. Then, eliminate the hard spots that cause bumps and arcs by spacing clamps at quarter-span length from either side of the feeder slings, which are also equally spaced on tangent. With tension in the feeder spans kept uniform and sag at each clamp point the same, the trolley wire is easily held at one level.

4. Boost Trolley-Wire Life

It's easy to fill scratches and pitted spots on trolley wire and eliminate excess arcing and wire burning when shoe collection is used. Mount an applicator filled with wire conditioner on a separate pole on the locomotive. In motion, the applicator will measure the quantity of conditioner needed, put it on the wire and smooth it to a uniform thickness in one operation. The conditioner should have a graphite base so that it won't put an insulated barrier between the wire and collector as oil and grease do.

5. Plan for Long Service

In purchasing line materials for mine installation, don't forget to figure the cost-saving advantages of corrosion resistance and reclaimability after years of use. For long service from malleable iron and steel materials, obtain products that have been hot-dip galvanized, a thicker type of protective coating that has been tested and proved for efficient corrosion resistance.



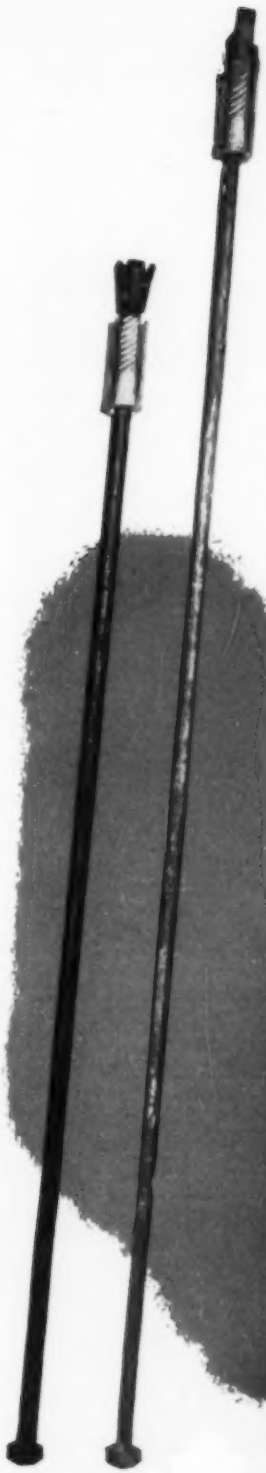
6. Standardize Equipment

Setting-up and maintaining product "standards" for trolley materials produce savings in these five ways: (1) simplified installation as all items fit together; (2) reduction of new purchases by reclaiming material from worked-out sections; (3) fewer production delays from breakdowns with the best equipment installed; (4) fewer parts need be stocked, without reducing the necessary stock of any one item; and (5) reduction of maintenance by setting up standardized, time-saving methods.

MORE ➡

YOU'RE INVITED to tell us about your successful "Operating Ideas." We will gladly pay you $10 or more for each usable one, on publication. Write The Editor, Coal Age, 330 W. 42d St., New York 36, N. Y.

O-B Shells and Plugs Help GET FULL STRENGTH FROM YOUR ROOF BOLTS



Here you see the results of a typical O-B field test of roof bolt strength, and of the holding power of O-B Expansion Shells and Plugs. At the left is a roof bolt before installation in the mine roof. At the right is the same bolt, which was pulled with test equipment until it broke, after the bolt was put in place in the mine roof. Instead of pulling out of the hole, this O-B Expansion Shell and Plug unit maintained its hold on the hole wall, forcing the bolt to stretch and break.

This is vivid proof of O-B Expansion Shell and Plug holding power. This is the kind of holding power that makes sure your roof bolts will maintain their installed tension. *Properly installed, these O-B units can develop the full tensile strength of 3/4 inch roof bolts.*

Write to Ohio Brass Company for complete information regarding these powerful expansion shells and plugs. Ask for Publication No. 4768-M.

O-B Field Test Equipment in use. Bolt Puller against roof in background. Hydraulic pump and operator in foreground.

O-B Expansion Shell and Plug for ¾-inch roof bolts and threaded rods.

Ohio Brass

MANSFIELD OHIO, U.S.A.

4768-M

7. Inspect and Repair Often

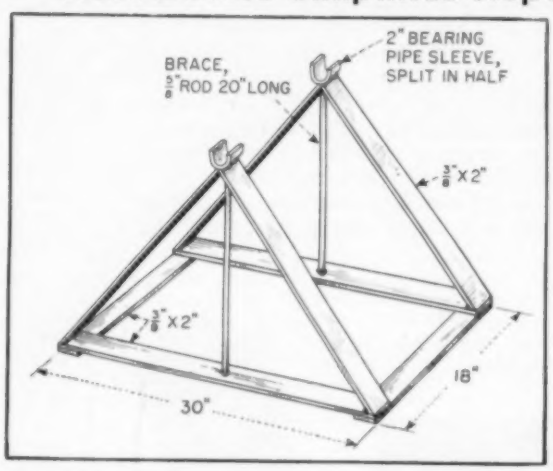
It pays to inspect overhead installations daily and repair or replace expendable parts before they fail, experience proves. With such attention to maintenance, at the cost of just a few extra dollars, expensive interruptions in the tonnage flow can usually be prevented. One mine with such rigid inspection policies has reduced its annual overhead maintenance costs to less than 0.011c per ton-mile.

TROLLEY COSTS . . . From p 96

8. Safety Means Economy

Safe working conditions attract experienced miners, encourage them to stay on the job, reduce accidents and permit maximum daily output. As elsewhere in a mine, it's smart economy to employ safe equipment and methods in trolley installations wherever possible, such as, trolley-wire guard boards at crossings and turnouts, rubber guards made from old inner tubes or belting for overhead switches, and warning lights and bells at grade crossings.

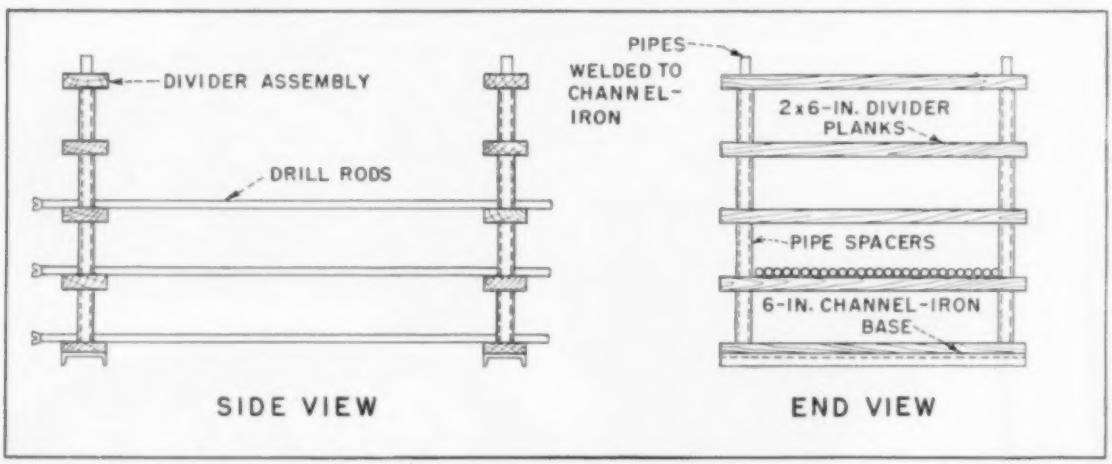
Reel Device Simplifies Rope Installation on Car Spotter



ANYONE who has ever installed a new rope on a car-spotting hoist will appreciate this reeling device that provides an easy means of controlling the wooden drum while transferring the new rope, writes Earl Baber, mine electrician, Summerlee, W. Va. With modifications of size and height as necessary to meet individual mine conditions, it obviously could be effectively used to facilitate installation of telephone cable, shuttle-car and loader trailing cables, small sections of belting, etc.

As illustrated in the drawing, construction of the reeler is a simple matter. Strap metal, ⅜ x 2 in, is used throughout, except for the two vertical braces, which are ⅝-in rod. Dimensions of the base frame are 30 x 18 in and the upright braces are 20 in long. Half-sections of a 2-in bearing pipe sleeve are placed on the top of the braces to hold the shaft put through the rope drum. All joints are welded.

In operation, Mr. Baber reports, a discarded 61EW headshaft is inserted through the wooden drum holding 300 ft of new rope and placed on the split sleeve sections. The free end of the rope is attached to the spotting-hoist drum and the hoist motor run until spooling of the hoist rope is completed.



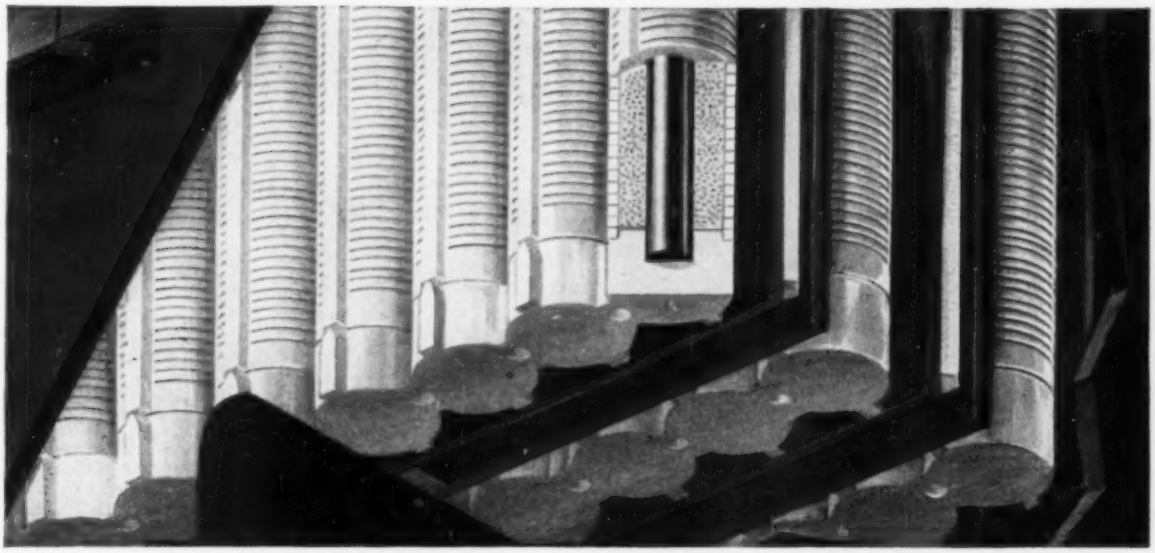
Easily Built Rack Provides Storage for Mine Supplies

HERE'S A RACK DESIGN you can readily adapt to your own requirements to simplify the storage and handling of drill rod, piping, sheet steel, iron rod, angle and channel iron and other supplies in a mine shop, warehouse, preparation plant or underground supply center. Design of the unit provides quick accessibility to the stored material, and the adjustable removable dividers permit arranging the storage sections for the most economical use of the space. The upright side rods are made of 1¼-in pipe welded to the channel-iron bases to give stability to the stack.

For Mine haulage . . . Exide-Ironclad now offers

★ **20% more capacity in the same space**

★ **Lowest cost per A.H. to own and operate**



This cutaway picture shows the inside of the new T H EXIDE-IRONCLAD Battery.

Its larger positive plates, containing corrosion-resistant Silvium, are different . . . unique . . . exclusive! No other type of positive plate construction offers you the advantages of the T H Exide-Ironclad, with its slotted plastic tubes, permanently sealed on the bottom with polyethylene tube sealer. More active material is exposed to the electrolyte, resulting in greater power. More active material is retained, providing higher battery capacity for a longer working life. Other features include improved negative plates . . . practically indestructible Pormax separators . . . new sealing compound . . . shockproof molded jar . . . unbreakable quarter-turn vent plugs of plastic . . . corrosion-resistant tray coating.

All of the features of the new T H Exide-Ironclad Battery construction provide direct operating-hour savings for you.

Now-more than ever before...
YOUR BEST POWER BUY AT ANY PRICE!

The new T H Exide-Ironclad BATTERY

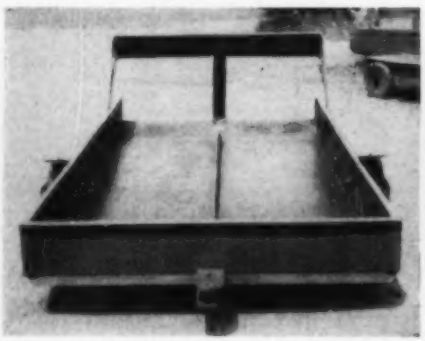
1888... DEPENDABLE BATTERIES FOR 66 YEARS...1954

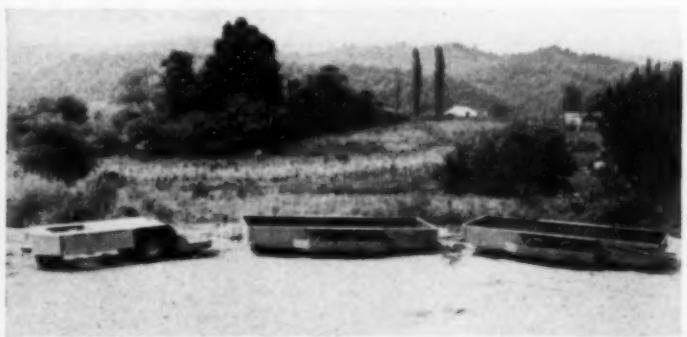
Thrifty Hauler

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 2 • *Exide Batteries of Canada, Limited, Toronto*

"EXIDE", "EXIDE-IRONCLAD", "SILVIUM", "PORMAX", *Reg. T. M. U.S. Pat. Off.*

Equipment News



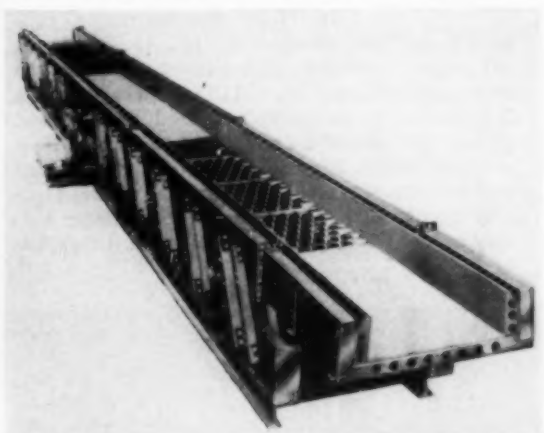


Dual-Purpose Cars Run on Both Track and Rubber Tires (1)

The Kersey "Rubberail Mine-Haulage System," a new method of transportation for coal mines employing a car with dual-purpose rubber-tired and flanged wheels, offers lower cost, more efficient coal haulage to the small-mine operator and also is adaptable to handling supplies in larger mines, the manufacturer reports. Designed for use particularly where the trackless haul exceeds economical limits, the Rubberail cars operate on their rubber tires in the section or rooms, being handled either singly or in groups by a rubber-tired tractor. For haulage from the section to the outside and return, the cars are made into trips and hauled on their flanged wheels by a locomotive. The cars have four wheels of each type and the transfer from one set to the other is easily made, the maker reports. Rubberail cars are available in various types and in three standard sizes, with capacities from 30 to 75 cu ft and track gages from 36 to 56½ in. For new mine development, they can be furnished with rubber tires only and flanged wheels added later. Full details from Kersey Mfg. Co., Box 150, Bluefield, Va. Circle No. 1 on postage-free card facing p 108 for descriptive Bulletin TL-100.

Trucks Built for Rough Terrain (2)

Two new 4-wheel-drive trucks specially designed for use in rough terrain have been announced by the International Harvester Co., Chicago 1, as follows: International R-140-4x4, with gross vehicle weight rating of 11,000 lb, 130- or 142-in wheelbase; and the R-160-4x4, gvw of 15,000 lb and 154- and 172-in wheelbase. The units are adaptable to exploration, construction and maintenance work, particularly where added traction and flotation are needed, such as over terrain not negotiable by standard 4x2 trucks, the maker says. The R-140-4x4 is powered by a 100-hp International Silver Diamond 220 engine, with a maximum torque of 173.5 at 2,000 rpm; the R-160-4x4 by a 108-hp International Silver Diamond 240 engine, with maximum torque of 192 at 1,400 rpm. Standard transmission is a sliding gear selective type with four speeds forward and one reverse and power take-off openings on right and left sides to handle a front-mounted winch.

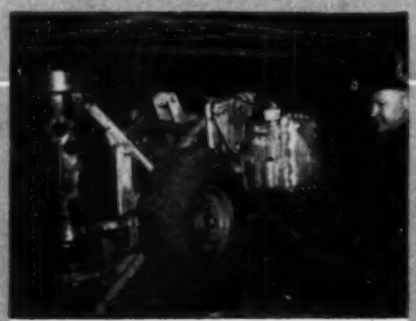


Vibrating Conveyors Cut Power Use (3)

New complete line of "Balanced, Dual Trough" vibrators for the conveying and/or screening of bulk materials, hot or cold, dry or damp, abrasive or corrosive, in a wide range of sizes, has been announced by the Syntron Co., Homer City, Pa. With the "Balanced, Dual Trough" principle, the unit requires maximum power only when starting and has low power requirements when running, the maker says. The vibrating conveyors, which can also be fitted with screen sections, are available in two capacities: Model 2-B, with maximum capacity of 60 tph, in sections up to 65 ft long with troughs 20 in wide, and in sections up to 30 ft long with 40-in troughs; and Model

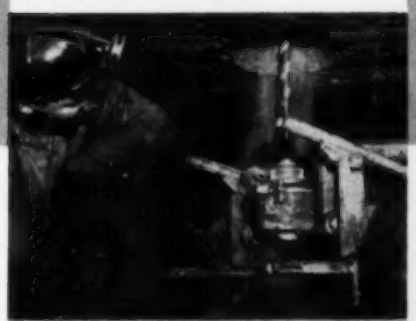
Raising the roof

at Barnes and Tucker's Mine #20



Before drilling bolt hole the RBD-30 is equipped with a 9¼" hitch bit to drill away the bony.

Photo courtesy of Kennametal, Inc.



After the bony core is removed, the RBD-30 makes a quick change to a regular auger and drills a 42" bolt hole inside the hitch hole. And without repositioning, it quickly sets expansion bolt.

Photo courtesy of Kennametal, Inc.

CP's compact RBD-30 Mobile Roof Bolting Unit helped solve an unusual problem at Barnes and Tucker's Mine #20 and at the same time demonstrated its adaptability and ease of handling in close quarters.

In a 31" seam it was necessary to remove 20" of bony to assure better ventilation and provide more headroom. The "low slung," 28" height of the RBD-30 permissible Roof Bolting Unit was ideal for this close quarter work. Its complete maneuverability enabled it to drill through the bony with a 9¼" hitch bit then quickly drill a 42" bolt hole and set expansion bolt into solid roof.

The RBD-30 operates equally as well in high seams. One motor drives both auger and bolt-setter – a telescopic chuck permits 10 inch auger adjustment to conform to roof irregularities. Slip clutches prevent feed motor from stalling – protect drill and bolt setting motor.

Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.

Other Chicago Pneumatic Coal Mining Equipment

Self Propelled Tramdrills

Actuated Drill Arms
For mine car, truck and locomotive mounting

Hand Held and
Post Mounted Coal Drills

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

6-F, capacity of 280 tph, in sections up to 175 ft with 20-in troughs and up to 100 ft with 40-in troughs. Literature with details from Syntron.

New Tractor-Shovel in Six Models (4)

A new line of heavy duty "Michigan Tractor-Shovels," available in three types and in six models with buckets ranging from 15 cu ft to 2¼ cu yd for a wide range of materials-handling applications, has been announced by the Clark Equipment Co., Buchanan, Mich. Among the features cited by the maker for the new units are: design and manufacture of all component parts for high quality and performance; easy accessibility to all major parts; heavier weight and more horsepower than units of comparable rating; steering boosters standard on all models; elimination of conventional foot clutch with torque-converter transmission controlled by manual levers on steering column and a 2-speed manual mechanical overdrive lever, for speeds up to 28 mph; and a specially designed planetary reduction in outer wheel hubs for low torque load on axles and high safty factor. Full details from Clark Equipment.

Side-Dumper for Off-Highway Hauling (5)

New Easton Model TD-1832H 32-ton side-dump trailer, built to work with the Caterpillar DW20 tractor, features large single tires, low center of gravity and outboard-mounted hydraulic jacks assuring high lateral stability even while dumping on the run, according to the Easton Car & Construction Co., Easton, Pa. Dumping, powered by the two hydraulic jacks controlled by the operator, is to one side only, but interchangeable mounting of the body and jacks permits reversal of dump direction. The patented Easton door mechanism operates automatically as the body is raised or lowered, with a maximum dumping angle of 50 deg. The door becomes flush with the floor at 20 deg, forming a chute to discharge the load clear of the running gear. The equipment is available through Caterpillar dealers. Bulletins covering 32- and 24-ton units offered by Easton Car & Construction.

UNIT-COOLED DC MOTOR (6)

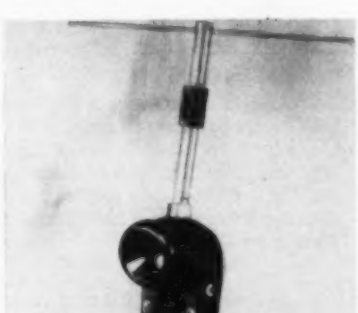
A new totally-enclosed, unit-cooled DC motor for use in severe atmospheres announced by the General Electric Co., Schenectady 5, N. Y., is the smallest standard model of its type. Available from 15 to 200 hp, it features 50% greater heat transfer in a 37% smaller unit than previous designs. Compact cooling units, mounted completely within the over-all size of the motors, permit operation at extremely low speeds for long periods of time because ventilation is independent of motor speed, and a double system of blowers assures rapid cooling, the company says. The new motors are available in the same ratings as standard, constant or adjustable-speed, general-purpose motors. Details from G-E.

BELT COVER FOR LONG LIFE (7)

Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J., has developed a new conveyor-belt cover which, the company says, promises resistance to abrasion and tearing never before offered, meaning longer conveyor belt life, particularly under heavily abrasive conditions such as with ore, rock and coal. Described by the company as a "radically new blending of superior and improved ingredients," the "XDC" conveyor-belt cover provides the truest balance-of-wear between strength members and cover yet devised, because giving superior flex life and added resiliency, the company says. It is being applied to a wide range of Raybestos-Manhattan belts. Details from the company.

TWO COMMUNICATION UNITS (8)

Two new devices for short or intermediate range communication—a battery-powered megaphone for distances up to ¼ mi and a radio transceiver for two-way communication—have been announced by Stewart-Warner Electric, Div. of Stewart-Warner Corp., Chicago 14. The megaphone (right, top) is a hand-held device, which embodies a microphone, a powerful speaker and six flashlight batteries in a single unit for amplifying the voice. Weighing 5 lb 5 oz, it is operated by a trigger switch in the handle to provide quick, clear projecton of the human voice up to a quarter of a mile, in construction work, inside plants,



B.F. Goodrich

Universal tires carry up to 30 tons, give full traction up steep grades

THE truck above, one of 70 owned by a Pennsylvania anthracite coal stripping firm, has just completed a trip from the bottom of a coal pit to the dumping platform. Loads run as high as 30 tons, and the trucks climb a steep road covered with razor-sharp rock. Tires take a terrific beating on hauls like this, costs skyrocket.

But this company uses B.F.Goodrich Universal tires, reports many tires have given 3,500 hours of service and are still going strong. Even after this rugged work Universal tires can be recapped for an additional 2,000 to 2,500 hours. One reason for this amazing record is the patented B. F. Goodrich nylon shock shield. Layers of strong elastic nylon cords under the tread stretch together to absorb smashing impact. Universal tires give you this 4-way saving:

(1) more original hours of service (2) more recappable tires and more hours of service per recap (3) increased bruise resistance (4) less danger of tread separation. You pay no more for the BFG nylon shock shield.

The Universal wedge-shaped cleats defy slippage, give 2-way traction. Specially-compounded rubber resists rock cuts and snags. Let your local B. F. Goodrich dealer show you how Universal tires can save you money. His address is listed under Tires in the Yellow Pages of the phone book.

Specify B. F. Goodrich tires when ordering new equipment

UNIVERSAL TIRES HAUL COAL over some of the roughest terrain in the Pennsylvania anthracite region. Even in this severe service Universal tires often can be recapped. Because these B. F. Goodrich tires can be mounted on any wheel position, you need fewer spares.

70 TO 85 THOUSAND POUND GROSS LOADS are carried by BFG tires month after month over rock-strewn roads and over no roads at all. The tires above have already rolled 3,450 hours! One reason for this amazing service is the B.F.Goodrich nylon shock shield.

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

The B. F. Goodrich Company
Department TO-366, Akron 18, Ohio

Please send me:

- ☐ Free information on off-the-road tires
- ☐ Free book, "How to get more recaps out of truck tires"
- ☐ Name of my nearest retailer

Name_____

Company_____

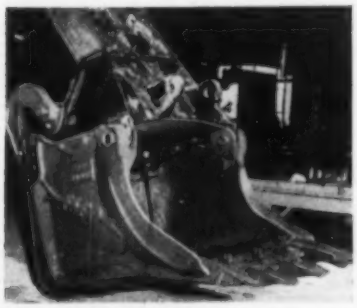
Street_____

City_____ Zone____ State_____

handling crowds, fire fighting, etc. Batteries will last for as long as three weeks of normal intermittent use. The "Portafone" radio transceiver carries FCC Class B radio-telephone-type approval and operates in the citizens' radio band at a fixed frequency of 465 mg. Weighing only 28 oz, it may be operated as a portable radio station when used with a battery pack, as a fixed central radio station by connecting it to a special power pack designed to plug into any 115 v, 60-cycle, AC outlet, or in an automobile by plugging a special adapter into the cigaret lighter socket of the car's instrument panel. Bulletins from Stewart-Warner.

MORE POWERFUL IGNITRONS (9)

New sealed ignitron mercury-arc rectifier developed by Westinghouse is capable of rectifying 1,000 kw at 250 v DC or 1,500 kw at 600 v using only six tubes, each of which is only 12 in in diameter, the company reports. The new tubes are designed so the welds can be cut, the tube repaired and then rewelded, a factory operation that makes the tube as good as new. Light enough to be handled by two men and mounted in neat, compact enclosed cubicles, the new tubes simplify rectifier installation in industrial plants, mines, etc. Details from Westinghouse Electric Corp., Pittsburgh 30.

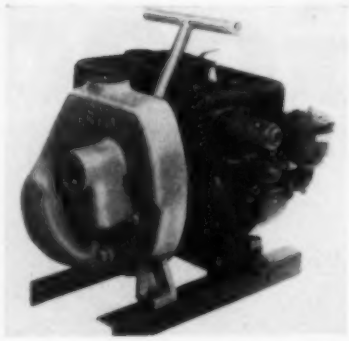


NEW-TYPE DIPPER (10)

A new "hopper type" all-cast rock dipper with a streamlined cutting edge has been developed by Electric Steel Foundry Co., Portland 10, Ore. The cutting edge has integral tooth horns to take solid-manganese or alloy-steel teeth or alloy-steel two-piece teeth, the front is designed with heavy rugged sections at maximum wear points and the dipper has an ESCO patented wedge-type door and latch mechanism, the maker says. The dipper is specially designed for use on a Northwest 80-D machine and weighs approximately 5,300 lb.

PORTABLE PUMP (11)

New Kenco 114 portable pump for industrial use, suggested by the maker for liquid transfer, fire fighting, dewatering pits and flooded areas, is completely self-priming, yet has no valves or moving parts other than the motor, pump impeller and seal. It delivers over 100 gpm at lowest head and is capable of forcing water to a maximum of 100 ft, with high-suction lift assured up to 25 ft of lift, it is reported. The pump is powered by the new Briggs & Stratton 1½-hp engine and the complete unit weighs 65



lb. There are no stuffing boxes and self-lubricating seal requires no adjustments, no greasing or packing. Bulletin S-102 with details from Kenco Pump Co., Lorain, Ohio.

NEW-TYPE PULVERIZERS (12)

New line of screen hammer-type pulverizers for medium-fine grinding called the "Ray-Ducer," is available in three sizes to handle a wide range of capacities, for medium-fine grinding of the softer materials, such as filter cakes, chemicals and similar materials. This new design is very compact, with mill, feeder motors and variable-speed feeder drive mounted on a relatively small metal base, and an outstanding feature is its unusual accessibility for inspection, maintenance, or changing screens. Bulletin No. 73 from Combustion Engineering, Inc., Raymond Div., Chicago 22.

HOIST BOOSTS PAYLOAD (13)

Said to provide up to 1,000-lb extra legal payload, a new front-mounted telescopic truck hoist available from the Hercules Steel Products Corp., Galion, Ohio, is designed especially for heavy-duty dump truck bodies 11 to 15 ft long. The 20-ton capacity hoist shifts hoist weight forward to put more load on the front axle, making possible maximum per-axle loads, the maker reports. Manufactured for single-or tandem-axle straight trucks, its lighter weight decreases deadweight and permits an increase in legal payload.

HIGH-CAPACITY BEARINGS (14)

Two new thrust roller bearings offering greater bearing capacities have been announced by the Rollway Bearing Co., Syracuse, N. Y. Bearings in one unit are seated in tandem along a machine shaft, one above the other, to provide twice the thrust capacity and eight times the life expectancy of a conventional thrust bearing, the company reports. The new Rollway tandem thrust roller bearing assembly generally achieves such results without the basic machine structure being altered in any way by utilizing axial space along a machine's shaft. The two bearings equally share the thrust load exerted by the machine shaft and have successfully supported loads as high as 300 tons, it is said. A new application of single-acting thrust roller bearings for use on railway transfer bridges and other high-capacity industrial loadings also has been introduced by Rollway. One bearing, Type T-21906, supports a vertical thrust load of 380,000 lb at 16 rpm and has a rated capacity of 700,000 lb. In this instance, the T-21906 roller bearing differs from most applications of single-acting thrust bearings, since a locating ring, which is roll-pinned securely to the stationary plate, maintains the roller assembly in perfect alignment instead of a center shaft. It is particularly suited for installation where space is limited, the company says. Details from Rollway.

ADJUSTABLE V-BELTS (15)

A new Veelos adjustable V-belt for D and E drives, known as TD and TE, is the easiest V-belt to couple and uncouple available, according to the maker, Manheim Mfg. & Belting Co., Manheim, Pa. Veelos TD and TE link V-belts are made of plys of especially treated high-tensile-strength canvas duck, joined by riveted studs with removable cup-washers and T-screws, which gives greater strength and durability at all key points, yet enables the belts to be coupled and uncoupled easily and provides maximum flexibility to last longer, run cooler and smoother, it is said.

MOTOR STARTERS (16)

A new line of AC combination starters with disconnect switches has been announced by Ward Leonard Electric Co., Mt. Vernon, N. Y. Known as Bulletin 4120 J.I.C. Starters, they are intended for use wherever non-reversing magnetic across-the-line starters with disconnect means at the starter location are specified. Features cited by the maker include compact construction; quick make and break disconnect switch mechanically interlocked with cover; front-of-board wiring; removable mounting panel; external mounting holes, oil-clearance pads on rear of enclosure; and easy access to shallow box. Maximum ratings: NEMA Size 3, 50 hp, 440 v, 3-phase, 60 cycles. Bulletin from Ward Leonard.

keen?

Keen judgement can save you a peck of trouble when it comes to picking the right line of lubricants . . . and top mining men, throughout the country, with a keen eye for increased production and fewer machinery repairs, have chosen the complete Cities Service line. Find out about the super-performance of Cities Service lubricants and take advantage of the free services of an expert Cities Service Lubrication Engineer. Write Cities Service Oil Company, Dept. A9, Sixty Wall Tower, New York 5, New York.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

Equipment Shorts You'll Want to Check

(17) BREAKER STRIP in which nylon and cotton are woven together to give strength and impact resistance now is standard on its heavy duty conveyor belts, the New York Belting & Packing Co., Passaic, N. J., has announced. The strength of nylon and the impact resistance and stretchability of cotton are combined in the new strip, which separates the belt carcass from the outer rubber cover, and the two materials are tied together to give increased cushioning and shock resistance to the belts, the company says.

(18) IMPROVED STANDARD BUCKET for the Caterpillar HT4 tractor-shovel has been developed by Caterpillar Tractor Co., Peoria, Ill. The new two-position bucket will provide greater flexibility because of an adjustable pitch and a deeper bowl, making the unit particularly effective for either excavating or stockpile applications, the maker says.

(19) BUCKET TEETH—Versatile box points and adapters with lightning-change features and tough-wearing qualities have been developed as a recent addition to its standard line of ESCO box points and adapters, according to the Electric Steel Foundry Co. Portland 10, Ore. A self-sharpening point which has been made bigger to guarantee longer point life under gruelling conditions, the R7R offers a heavy duty 45-lb point 7 in wide, 12 in long and 1½ in thick through the point section and is said to be particularly serviceable on larger shovels from 5- to 15-yd capacity. Details from the company.

(20) PORTABLE DRAWING BOARD, molded of clear durable plastic for precision drawing, sketching or designing, weighs less than 8 oz and measures 9¾ x12¼ in. Four recessed corner clamps hold 8½x11-in paper without thumbtacks or tape and two retractable metal straight edges, one horizontal, one vertical, simplify precision work without need of a T-square. Sold for $3.95 from the Graphostat Co., East Orange, N. J.

(21) SPLICING TAPE—"CSI Cable-Splice" rubber tape offers high safety and long wear for electrical and general use, the maker says, featuring impervisousness to copper through special blending; 19,000-v dielectric strength; acid and corrosion resistance; and high cohesive properties, permitting application lengthwise by pinching without winding. Data and sample from CSI Sales Co., Solon, Ohio.

(22) SAFETY WHEEL BLOCK introduced by Calumet Steel Castings Corp., Hammond, Ind., is 14 in high and has a 15x10-in base to provide maximum stability and holding power for blocking unusually heavy vehicles and loads. A heavy duty unit cast in one piece of high strength alloy steel, with heavy gripper teeth on the base, the block is said to provide positive holding on any surface, including ice, wet pavement, packed clay, etc., and accommodate the largest truck tires.

(23) SUCTION HOSE—Hamilton Rubber Mfg. Corp., Trenton, N. J., has announced "Revelation," a high-grade smooth-bore suction hose with red covers, in which the wire has been eliminated and replaced by a specially treated hard twisted cord. Available from 1 to 3 in, this special hose has the advantage of recovery to original shape after being run over or crushed, it is said. Samples, prices and details from Hamilton.

(24) VIBRATION DETECTOR—A highly sensitive crystal-type accelerometer designed as a basic detection element for use in measuring vibration acceleration up to 50 Gs in large rotating apparatus has been announced by the General Electric Co., Schenectady 5, N. Y. Called the vibration detector, it can be used on turbine generators, large motors, blowers, steam and gas turbines and centrifuges, where excessive vibration can result in extensive damage. Details from G-E.

(25) PARTS STORAGE — "See-Thru" drawer cabinets for small-parts filing and storage are available in models with 8 to 128 drawers made of clear plastic. For example, Model J-20 consists of 20 lifetime-guaranteed plastic spillproof drawers in a welded all-steel cabinet, with an over-all size of 10¾x12½x6 in, equipped with adjustable drawer dividers and identification labels, and priced at $7.95, postpaid. Literature from General Industrial Co., Chicago 30.

(26) SUMP PUMP—Designed for portable or stationary service, Penberthy's new automatic electric submersible sump pump with 1¼-in discharge, has a capacity of 2,200 gph at a discharge head of 10 ft, pumps 400 gph at 24-ft head. Operating either continuous or intermittent duty and featuring positive priming without venting, it is a compact unit only 12½ in high, 10 in in diameter and weighs 14 lb. Details from Penberthy Injector Co., Detroit 2, Mich.

(27) TRUCK HOISTS—Two completely new arm-type hydraulic hoists for on- or off-highway application that feature 70 deg dump angles to assure quick, sure cleanout, even with sticky materials in scoop-end bodies, have been announced by Gar Wood Industries, Inc., Wayne, Mich. Gar Wood's new hoists offer features such as clevite-type bushings at all pivot points, cylinders that open at both ends and other engineering details said to assure maximum serviceability and long, trouble-free performance. Bulletin W-129 provides full details on Models 2825 and 2025 hoists, with 25-and 30-ton payload capacities.

(28) TEST-LIGHT and fuse puller combination made of plastic has jaws shaped to hold all cartridge fuses up to 100 amp. The "Hi" tester and fuse puller eliminates the danger of inserting or removing cartridge fuses by hand; prevents bending of clips through improper removal, and may be used for handling live electrical parts up to 600 v, AC-DC, it is said. Details from Holub Industries, Inc., Sycamore, Ill.

(29) TIME-DELAY RELAY — A new compact and lightweight, hermetically-sealed time-delay relay developed by the AGA Div., Elastic Stop Nut Corp. of America, Elizabeth, N. J., may be used in industrial-control devices which have to operate in wet, corrosive, dusty or explosive atmospheres. The Type SF Agastat is solenoid-operated and pneumatically-controlled, housed in an enclosure 2⅛ in square and 4 in high and weighs 1.2 lb. Time delay is adjustable from approximately 30 millisec to more than 1 min.

(30) ROD CUTTER—A 1¼-in steel rod can be cut in 3½ sec with a new Manco hydraulic Guillotine Model 21 and the unit, which also can cut aluminum rod to 1⅝ in, is designed for use in cutting and trimming coiled rod stock; for cutting on the draw bench; test cuts for piping, etc. Details from Manco Mfg. Co., Bradley, Ill.

(31) SAFETY LENSES using two types of new plastic have been developed by the United States Safety Service Co., Kansas City 6, Mo. The new Optilite A safety lens has an extremely hard surface giving it super scratch resistance and longer life while weighing only half as much as safety glass, and on jobs where pitting and spatter are encountered, will last 10 times as long as glass, the maker says. The Optilite B safety lens, a different-formula plastic and extremely low in cost, is recommended for operations where short lens life is expected.

(32) DIESEL - ENGINE - DRIVEN-WELDER, the newest in the Hobart "Multi-Range" line has a 300-amp capacity and is especially designed for locations where electric power is not available and a minimum operating cost is desired. Powered by a General Motors Model GM-2055, 2 cycle unit-injection 67-hp diesel engine, this arc welder also has a remote control that permits the operator to make close adjustments right at the work, with some 1,000 combinations of voltage and ampere providing the right arc intensity to suit any job, the maker says. Details from the Hobart Bros. Co., Troy, Ohio.

(33) WIRE STRIPPER—The "Hi-Speed" completely automatic hand-type wire stripper said to eliminate triggers, cocking or other holding devices, has been introduced by Holub Industries, Inc., Sycamore, Ill. It is designed to strip all kinds of building and fixture wire with a single squeeze of the handles and is made in seven sizes, each with adjustment for insulation and adhesive variations.

(34) AIR COMPRESSOR-DUMP TRUCK unit consists of a Davey Model 105 "Auto-Air" unit and a Galion All-steel Model 12 contractors' body, both suitable for mounting on a wide range of

PAGES
MISSIN
ARE
AV

NG
NOT
VAILABLE

If you do this to a cable...

you'll want *flexible* G-E Type SH-D

When you're trying to get out the maximum tonnage each hour, cables usually take a beating. Bending, pulling, and crushing of portable cables are common causes of cable failure. To meet these conditions, use G-E Type SH-D Geoprene portable cable. With this cable you'll obtain longer cable life with consequent low replacement cost—what's more, you'll obtain easier handling and increased protection to equipment and personnel. General Electric's Type SH-D construction contains unique features of flexibility and durability which best protect this type of cable against the service abuses encountered.

Its flexibility means long life and protection to equipment and personnel

The ground wires are minutely stranded with a short lay for maximum flexibility and are approximately equal in total cross section to one main conductor. Each is encased in braid so that, when bent, the wires will slide rather than break. As a result, this cable has never, to our knowledge, had a single case of failure from broken ground wires. This flexibility and the large cross-sectional area of the ground wires reduce the hazards of faults.

The shielding is a combination cotton and copper braid which is more flexible and therefore less subject to breakage than an ordinary all-copper braid. Yet it has a copper content that gives full shielding protection against corona.

The treated jute fillers permit internal movement of the conductors to relieve strains caused by bending.

All of these features of flexibility make the cable last longer, and make it easier to handle and to move.

Its durability prolongs cable life

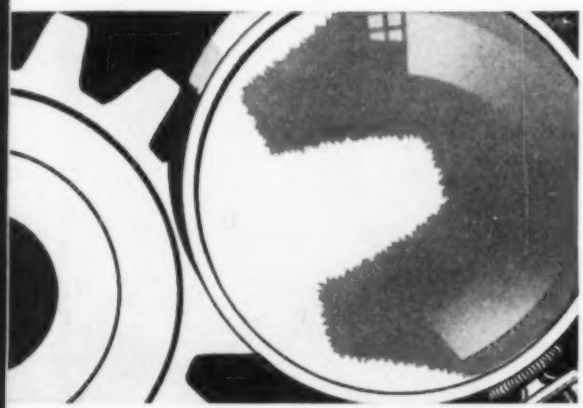
The strength, toughness, and resistance to fire, oil, and corrosives of Geoprene cables have been proved by many years of service. Also in G-E Geoprene Type SH-D cables the inner and outer jackets and the reinforcing corded mesh are bonded together like a reinforced tire for maximum resistance to pulling stresses, crushing, and abrasion—and for longer cable life.

For uninterrupted operation of shovels, draglines, loaders, and other heavy portable equipment, and to reduce cable replacement costs—investigate G-E Geoprene Type SH-D portable cables. General Electric has a full line of wires and cables to meet the needs of the mining industry. For more information, write Section W105-114, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

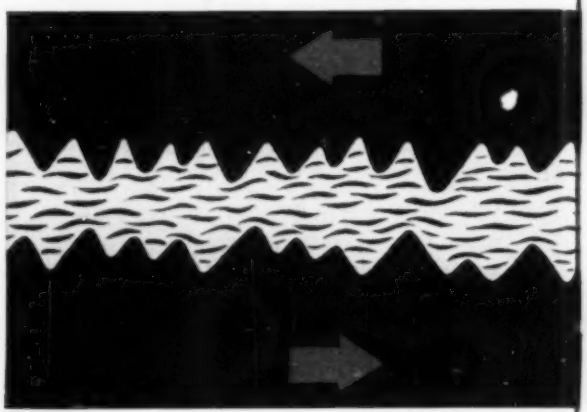
You can put your confidence in—

GENERAL ELECTRIC

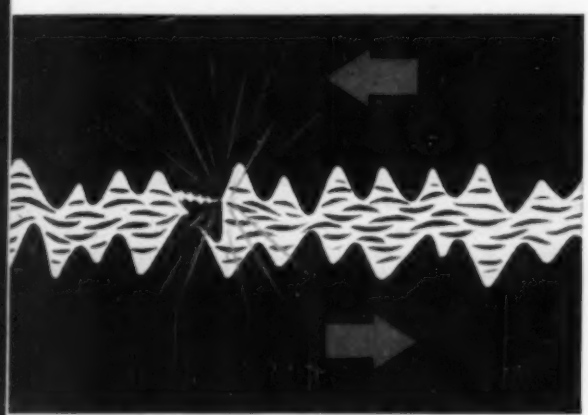
HOW SUNEP PREVENTS GEAR WEAR



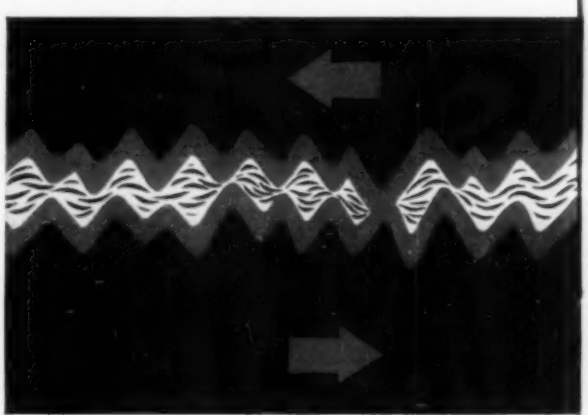
The surface of a gear may seem smooth, but when greatly magnified it looks something like this. The lubricant must keep these jagged edges apart.



With ordinary oil, a thick film is needed to keep these metal surfaces apart. The thickness of the film depends on the viscosity of the oil and other factors.



It is difficult to maintain a thick oil-film in everyday practice. The oil film thins out and semiboundary lubrication results. With ordinary oil, metal to metal contact occurs and gears wear.



Sunep coats the surfaces with a chemically bonded film which is virtually unbreakable. This film, although only about 0.0000001" thick, keeps the surfaces apart, withstands heavy loads and sudden shocks, prevents wear.

Sunep has many advantages. In addition to its outstanding load-carrying ability, it is noncorrosive; it keeps gears and bearings clean; it prevents rusting; it stays put. Sunep has proved especially effective for gear cases in locomotives, coal cutters, drilling machines, loaders, shuttle cars, etc. For more information about Sunep and how it protects your equipment, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. CA-1.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

SUNOCO®

PHILADELPHIA 3, PA. ◆ SUN OIL COMPANY LTD., TORONTO & MONTREAL

News Round-Up

FOPC Intensifies Campaign Against Residual Oil Imports

A RENEWED and intensified campaign—in Congress and elsewhere—against unrestricted imports of residual fuel oil was set in motion at Chicago Dec. 11 at a meeting of the Foreign Oil Policy Committee.

The meeting was attended by over 200 representatives of coal producers, wholesalers, retailers, coal and railroad unions, manufacturers of coal-mining equipment, the metal-mining industry, at least two companies engaged in manufacturing, one independent petroleum producer, and state mine officials and senators and representatives from coal-producing states.

Featured speakers of the general session included Sen. Matthew M. Neely, of West Virginia, and Congressman John P. Saylor, of Pennsylvania, who pledged support in curbing dumping of oil and other products in the United States; George Sokolsky, nationally syndicated columnist, who warned against weakening the United States by giveaway programs and unrestricted imports; and John T. Jones, United Mine Workers of America, who declared that the union was in the fight against oil imports to the finish and desired the same wholeheartedness from other parties concerned.

FOPC announced plans for intensified effort through regional and local organizations, intensified public-relations work, and enlistment of other industries affected by imports in the campaign. Great stress was laid on individual effort directed at members of Congress and molders of public opinion.

In realigning the organization to give strength to the coming campaign, the committee elected L. Newton Thomas, president, Carbon Fuel Co., Charleston, W. Va., chairman of its executive committee, succeeding Dr. R. E. Snoberger, president, Truax-Traer Coal Co., who has been forced by ill health to limit his activities. At the same time, it increased the membership of the executive committee from 15 to 20 to permit retaining Dr. Snoberger in a policy-making capacity and provide additional representation for other interested organizations and industries.

Final action of the meeting was adoption of three resolutions. One was an expression of appreciation to the 161 members of the House of Representatives who voted for the Simpson Bill, including restriction of foreign-oil imports, in the last session of Congress. The second reaffirmed the FOPC policy statement of March 4, 1953. The third, addressed to President Eisenhower, asked for (1) a re-examination of foreign-trade policies, (2) executive review of these policies, (3) special attention by the Randall committee to the question of oil imports, and (4) an opportunity for FOPC to present data on such imports.

Also in This Section

News Briefs and Trends ..... p 112
Personal Notes ..... p 114
CMIA in 67th Meeting ..... p 116
Missouri Coal Conference ... p 122
Obituaries ..... p 124
Association Activities ..... p 126
Among the Manufacturers ... p 131
New Preparation Facilities ... p 132
Kentucky Mining Institute .... p 134
New Books for Coal Men .... p 172

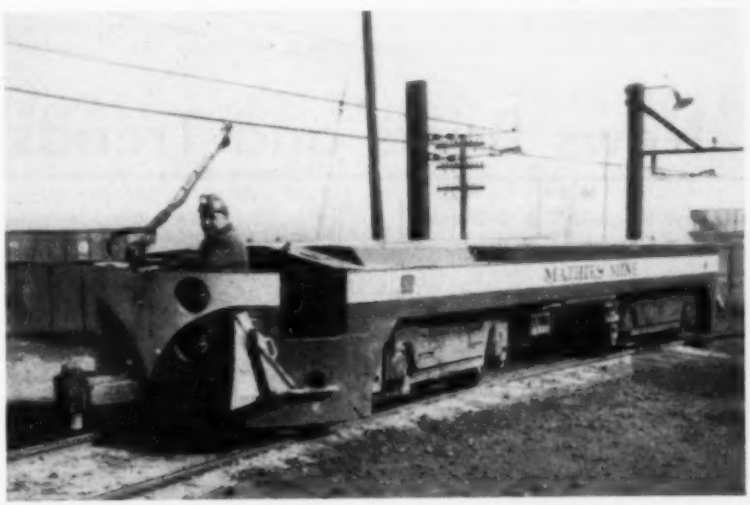
Bituminous Coal in 1953

Bituminous coal mines produced about the same tonnage in 1953 as in 1952 and at the same time mine operators spent an estimated $500,000,000 for new equipment and the maintenance and repair of facilities to keep the industry strong to meet any future emergency demands that may be made upon it, reported Bituminous Coal Institute in its year-end analysis released last month.

Mine output for 1953 is expected to total around 460,000,000 tons against 467,000,000 in 1952, but anticipated consumption in the United States for the year of around 426,000,000 tons will be an improvement over 1952, when consumption totaled 419,000,000 tons, BCI said.

For the first quarter of 1954, however, best available information indicates production slightly greater than in the initial 3 mo of 1953 when output was 110,000,000 tons. The trend of production in 1954 depends to a large extent on the level of industrial activity and also on the action taken, if any, to curb the flood of imported residual oil and the wasteful use of natural gas as a boiler fuel, BCI pointed out.

Railroads used less coal in 1953 than in the year before, 28,000,000 tons, against 38,000,000. Other industrials, in



Mathies' Mine Locomotive the World's Largest

WEIGHING 50 TONS and reported to be the largest single unit in the world, this 8-wheel locomotive was put in service Nov. 13 at the Mathies mine of the Mathies Coal Co., Finleyville, Washington County, Pa. The new 600-hp unit is 35 ft long and has one 150-hp motor for each axle. With a rated drawbar pull of 25,000 lb at 10.6 mph, the new General Electric locomotive is able to pull 1,600 tons on straight, level track, or the equivalent of 110 of Mathies' loaded mine cars. Normal trips are 45 to 50 cars. The locomotive was designed primarily to haul loads against a grade of 2%.

Lewis Throws Weight Behind N. Y. Dock Union

ACTING the day before the start of a NLRB election to determine the bargaining preferences of some 22,000 dock workers, John L. Lewis, UMWA head, stepped squarely into the turbulent New York waterfront situation. In a session in his Washington office Dec. 21, Mr. Lewis discussed affiliation and financial support with Capt. William V. Bradley (right), president of the International Longshoremen's Association, the union expelled by the American Federation of Labor last September on charges of gang domination.

While he willingly posed for photographers, Mr. Lewis left it to Capt. Bradley to brief the press. Although he did not go into detail, Capt. Bradley acknowledged that they had discussed affiliation of the ILA with the UMWA and that he personally was in favor of it if the ILA won the bargaining election. He also announced that "our financial worries are over." It had been reported the week previously that the UMWA had loaned $50,000 to the nearly bankrupt ILA and that more was available if needed.

According to reports, Mr. Lewis offered his support to the longshoremen for two reasons: his evident, though unconfirmed, desire to form a third major labor organization; and his antipathy to George Meany, AFL president, who has not welcomed his bids for participation in AFL-CIO merger discussions. After expelling the ILA, the AFL set up a new longshoremen's union, and both groups have been carrying on an intensive campaign among the dock workers preparatory to the NLRB election. Outcome of the election was not expected to be affected by Mr. Lewis' support since the ILA was thought to be still dominant, labor experts believed. Although various authorities had sought to have the NLRB delay the election to provide more time for the workers to make up their minds, the NLRB refused, presumably to complete the balloting before the Taft-Hartley 80-day no-strike injunction expired Christmas Eve.

spite of adjustments to economic changes, used 97,000,000 tons of coal in 1953, a 1,000,000-ton increase. On the basis of the latest figures of the USBM, coal distributed by retail dealers in 1953 probably will amount to 60,000,000 tons, compared with 68,000,000 in 1952.

Overseas exports of bituminous coal dropped in 1953 to 14,500,000 net tons, while shipments to Canada in 1953 were down slightly to around 20,000,000 tons from 21,000,000 in 1952.

As usual stockpiles of bituminous coal fluctuated month by month but at the close of 1953 above-ground stocks totaled around 80,000,000 tons, or a little more than 3,000,000 tons more than at the start of the year.

Present indications are that steel mills —after breaking all production records in 1953—will again in 1954 use more than 100,000,000 tons of coal, while electric utilities appear almost certain to set another record for coal consumption after using approximately 112,000,000 tons in 1953—more than ever before.

News Briefs and Trends

West Virginia C & C Gives Mining Town to College

The West Virginia Coal & Coke Dec. 11 presented the entire mining community of Norton, W. Va., to the Davis and Elkins College, in nearby Elkins. Included in the gift were 70 acres of surface lands and 113 houses recently leased to the Norton Coal Co. The company sold the actual mining operation to Norton Coal Oct. 31. Dr. Davis K. Allen, administrator of the college, which has some 600 students, said that the gift was the largest ever received by the institution since its founding in 1903 and would provide a "substantial" income.

Pocahontas Fuel, Clinchfield Acquire Tennessee Mines

A. R. Matthews, president, Pocahontas Fuel Co., Inc., Pocahontas, Va., announced Dec. 15 the purchase by Pocahontas of the Moore Coal Co., Knoxville, Tenn. The Moore Coal's operation at Devonia, Anderson County, Tenn., consists of two mines on the Tennessee R.R., with a productive capacity of 700,000 tons per year. Acquisition of the properties with their large reserves places Pocahontas Fuel in a position to serve the rapidly growing demands for coal in the south central states and is part of the company's program of diversification and expansion, Mr. Matthews stated. Inter-Mountain Coals, Inc., Knoxville, will act as sales agent for the production of the mines.

Also reported last month was the acquisition by the Clinchfield Coal Corp., Dante, Va., of the Meadow Creek Coal Co., operating the Solon No. 3 mine, Monterey, Putnam County, Tenn. Fully mechanized, the property has some 80 employees and has been producing about 300,000 tons a year. A large part of the output of both the Moore and Meadows Creek companies, which has been going to the Watts Bar plant of the TVA, is expected to be taken by the TVA's new Kingston steam plant, now nearing completion.

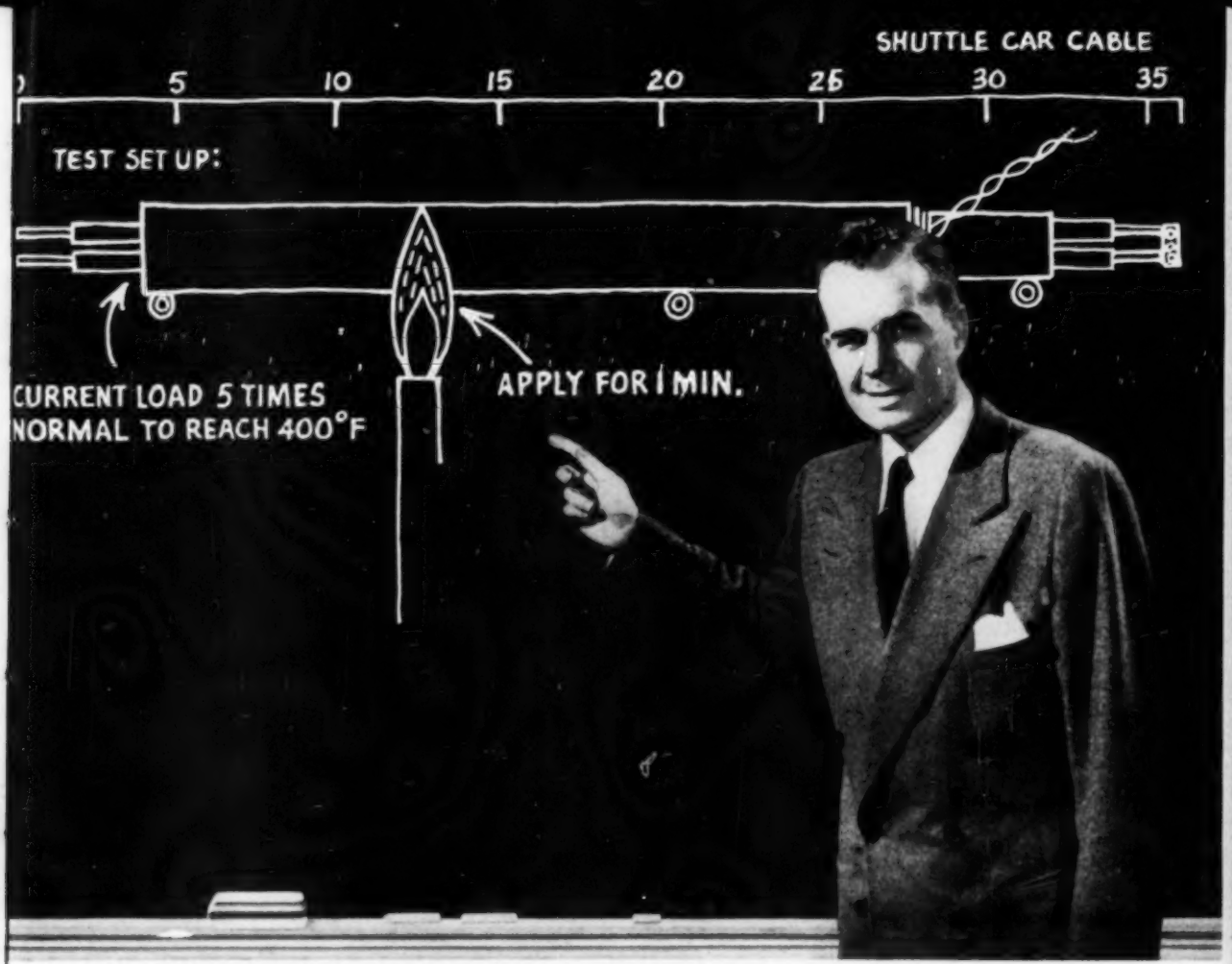
Survey Group Named to Study USBM Organizational Setup

Coal was well represented in the membership of a 7-man survey group named last month by Secretary of the Interior McKay to study the organizational setup and operating procedures of the USBM. Included on the team were D. L. McElroy, vice president, Pittsburgh Consolidation Coal Co., Pittsburgh; and Spencer S. Shannon, Bedford, Pa., retired coal operator and former head of the National Security Resources Board's materials office. Chairman of the group is Dr. Curtis L. Wilson, Dean of the Missouri School of Mines, and other members include: J. S. Butler, Houston, Tex., oil man and vice president of the Independent Petroleum Association of America; John C. Kinnear Sr., former vice president of Kennecott Copper Co. and now assistant director, ODM; Henry Caulfield, of the Interior Department's technical review staff, plus another Interior official to be assigned. The group was slated to start its study Dec. 14 and submit the report to Mr. McKay by Jan. 30.

Review Board Reverses USBM On Gassy Mine Classification

The Federal Coal Mine Safety Board of Review last month reversed an order of the director of the USBM in a gassy classification case under the Federal Coal Mine Safety Act. In the case of the Rebecca Coal Co., the Bureau had made a finding that a sample of mine atmosphere taken in the company's Seaboard No. 1 mine contained 0.26% methane

(Continued on p. 126)



APPROVED USBM TEST: Cable fails if it burns more than 6 inches or flames more than 3 minutes.

NO ANACONDA CABLE EVER FAILED THIS TEST

The U.S. Bureau of Mines flame-test for trailing cables is tough. But ANACONDA Cables have passed every time...*with ease*. That's not all! Performance-wise, a recent survey of shuttle cars in 15 mines found ANACONDA Cables last up to 300% longer than cables used only a few years ago.

NEW FEATURES GIVE CABLE STAMINA

These facts are as good a certificate of quality as any we know. As new features have been added to ANACONDA Shuttle Car Cables, each has been repeatedly tested on special, scientifically designed equipment. A new improved neoprene jacket is tougher, more flame-resistant. You'll find more strength and heat-resistance in the new cold-rubber insulation. The cable has also been stranded in a new and decidedly better way. No wonder it can take more abuse from overloads, compression-cutting, sliver-cuts in wet mines, rib-pinching, runovers and dragging. Patented breaker strip* and balanced tensile strength of ground and power conductors make it safer to use.

A CLOSE LOOK AT CABLE COSTS

Examine this cable yourself. Ask your Anaconda Sales Office or Distributor for a sample. Test it . . . tear it apart. Then look at the cost of *one* shutdown on any working face of your mine caused by *one* break in cheap cable. It far exceeds any possible saving from buying cable on price. Your own production figures soon prove the value of quality cable. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.* *U. S. Patent No. 2,455,773

ANACONDA®

TODAY'S HEADQUARTERS FOR MINE CABLE

Personal Notes

Parton Made LNC Vice President

W. Julian Parton, above, general manager since March, 1951, has been elected a vice president and director of Lehigh Navigation Coal Co., Lansford, Pa. Joining Lehigh Navigation as a junior engineer, Mr. Parton has held the positions of preparation engineer, supervisor of flotation projects, production planning engineer, and superintendent of the Nesquehoning colliery, prior to becoming assistant to the general manager in 1948. Also elected vice presidents and directors of the company were **Richard C. Newbold,** who will be in charge of sales, and **John C. Bolinger Jr.,** who has been assistant to the president for over 3 yr. Prior to joining the Old Company as sales promotion manager, Mr. Newbold was vice president in charge of sales, Theodore Presser Co. from 1948 to 1951. Mr. Bolinger has been associated with the Old Company for the past 6 yr. **D. C. Helms** and **Robert E. Hobart,** directors of the company since 1948, have resigned from the board and have entered into retirement after many years of service with the company.

Hugh Ellis, superintendent, Ehrenfeld operations, Pennsylvania Coal & Coke Corp. since 1928, has resigned to become assistant superintendent at Maryland shaft mine, Berwind-White Coal Mining Co., St. Michael, Pa. **Kenneth L. Richardson,** mine foreman at Pennsylvania Coal & Coke's Mosscreek mine, has been named to succeed Mr. Ellis, with the title of general mine foreman. **Ellsworth Jones,** assistant mine foreman, has been named to succeed Mr. Richardson.

George E. Daugherty, safety director for the past 19 yr, Red Parrot Coal Co., Prenter, W. Va., has retired. Holder of mine foreman certificates in West Virginia, Pennsylvania and Kentucky, Mr. Daugherty was for 10 yr a federal mine inspector in Kentucky, Virginia and Tennessee.

George R. Beehler, assistant to William W. Everett, vice president-operations, Glen Alden Coal Co., last month was named general manager of the company, Mr. Everett announced. With Glen Alden since 1922, when he joined the organization as a special engineer to the vice president and general manager, Mr. Beehler has long been active in labor relations and administrative matters for the company. A mining-engineering graduate of the Columbia School of Mines, Mr. Beehler worked for a short time in the Colorado gold fields and for the Lehigh Coal & Navigation Co. and The Hudson Coal Co. before joining Glen Alden.

Joseph Bierer, chief of the West Virginia Department of Mines, submitted his resignation last month, effective Dec. 31. Reported as a possible successor to Mr. Bierer was **Frank B. King,** his executive assistant.

James H. Forgie, safety engineer for the Mining Div., Armco Steel Corp., was to retire Dec. 31 after more than 25 yr service with Armco, it was announced last month by C. O. Kane, division manager. Mr. Forgie has spent almost his entire career in mine work and is well known for his achievements in the safety field. He is being succeeded as safety engineer by **Alex Kelemen,** presently training advisor and suggestion coordinator for the mining division. Mr. Kelemen joined Armco as a coal loader in 1934 and has held various supervisory and production posts, becoming training supervisor in 1947 and suggestion coordinator in 1948.

R. R. Williams Jr. has been named assistant manager of the mining department of the Colorado Fuel & Iron Corp., it was announced last month by George Rupp, manager of mines for the corporation. Mr. Williams has been supervisor of blast furnaces at the CF&I Pueblo plant for the past 6 yr. In the newly created position, Mr. Williams will work closely with Mr. Rupp, who has guided the rapidly expanding CF&I mining department since 1929.

COAL AGE was founded in 1911 by the Hill Publishing Co. In 1915 COLLIERY ENGINEER, with which MINES AND MINERALS previously had been consolidated, was absorbed by COAL AGE.

When, in 1917, the Hill Publishing Co. and the McGraw Publishing Co. were consolidated to form the present McGraw-Hill Publishing Co., Inc., COAL AGE became a member of this larger publishing enterprise. On July 1, 1927, the journal was changed from a weekly to a monthly.

During 43 years the editorship has been held successively by Floyd W. Parsons, R. Dawson Hall, C. E. Lesher, John M. Carmody, Sydney A. Hale and Ivan A. Given. The editorial staff of COAL AGE presently consists of: Ivan A. Given, J. H. Edwards, William H. McNeal, W. A. Stanbury Jr., Harold Davis and A. E. Flowers.

P&R Advances Clark

GEORGE J. CLARK, (above) general manager since 1951, has been named vice president, Philadelphia & Reading Coal & Iron Co., succeeding the late George A. Roos. Joining the company in 1933 following his graduation from Rennselaer Polytechnic Institute, Mr. Clark served as chief engineer and president of Shen-Penn Production Co., a subsidiary, becoming general manager of P&R in 1951.

Bell & Zoller Coal & Mining Co., has announced the appointments, effective Nov. 1, of **Herman E. Knight** as general superintendent of its Kentucky properties, and **Eugene T. Moroni** as chief engineer.

John Lunski, foreman of No. 20 Tunnel, Truesdale, from 1946 until its recent closing, has been named superintendent, South Wilkes-Barre colliery, Glen Alden Coal Co., succeeding **Thomas Williams,** who retired because of ill health. Joining Glen Alden in 1921 as a breaker boy at Bliss colliery, Mr. Lunski held jobs as laborer, bratticeman, fire boss and section foreman before being made mine foreman in 1946. Mr. Williams joined Glen Alden in 1921, and was inside foreman from 1940 until his promotion as superintendent, South Wilkes-Barre colliery in 1950.

Dr. Paul Fugassi, professor of chemistry, has been named director of the Coal Research Laboratory, Carnegie Institute of Technology, Pittsburgh, Pa., succeeding **Dr. H. H. Lowry,** who resigned in 1953 to accept a position in industry.

"Tycol Acylkup boosts bearing life... smooths the way for heavier loads"

Of course! Tycol Acylkup Bearing Grease "stays put" . . . keeps anti-friction bearings running smooth and cool. Finest quality neutral oils give it high load-carrying capacities. Tycol Acylkup is firmly resistant to the washing action of water. Its dependable lubricating abilities lengthen bearing life and reduce maintenance costs. Call your nearest Tide Water Associated office for further information.

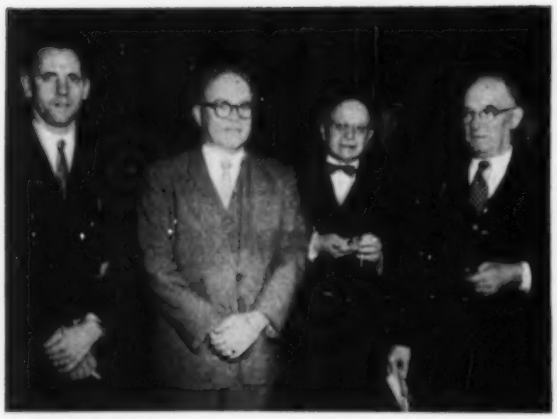
TYCOL

INDUSTRIAL LUBRICANTS

Boston • Charlotte, N. C. • Pittsburgh
Philadelphia • Chicago • Detroit
Tulsa • Cleveland • San Francisco

TIDE WATER ASSOCIATED OIL COMPANY

17 BATTERY PLACE - NEW YORK 4, N. Y.



CONTINUOUS MINING—G. W. Stump (left), Rochester & Pittsburgh Coal Co.; J. H. Truax, Duquesne Light Co.; H. P. Greenwald, USBM; W. P. Powers, Pa. Mines Dept.

EDUCATION, SAFETY—S. P. Polack (left), USBM; M. D. Cooper, National Coal Association; W. N. Poundstone, Christopher Coal Co.; and G. R. Fitterer, Univ. of Pgh.

ROOF CONTROL—J. L. Rozance (left), Pittsburgh Coal Co.; G. J. Steinheiser and W. R. Cunningham, Penna. Dept. of Mines; and E. J. Carroll, U. S. Steel Corp.

INSTITUTE OFFICERS—J. J. Snure (left), Rochester & Pittsburgh, president; and J. M. Lowe, Hillman C. & C., secretary-treasurer.

Coal's present problems and brighter future viewed at 67th meeting of . .

Coal Mining Institute of America

Institute Themes:

Roof control — **Coal's future**

Continuous mining — **Shaft safety**

Mining education

ROOF-COATING, roof-bolting and preventing roof-fall and shaft-sinking accidents; use of continuous mining machines in development and pillar-recovery; status of education in the mining industry, and the future of coal in the Tri-State area were major themes of technical sessions at the 67th annual meeting of the Coal Mining Institute of America, at Pittsburgh, Pa., Dec. 10-11.

Officers elected for 1954 by more than 650 members in attendance are as follows:

President—J. J. Snure, production manager, Rochester & Pittsburgh Coal Co., Indiana, Pa.

Vice presidents—T. G. Ferguson, vice president, Pittsburgh Coal Co., Div. of Pittsburgh Consolidation Coal Co., Pittsburgh; W. P. Powers, mine inspector, Pennsylvania Dept. of Mines, Pittsburgh, and J. T. Ryan Jr., president, Mine Safety Appliances Co., Pittsburgh.

Secretary-treasurer—J. M. Lowe, cost accountant, Hillman Coal & Coke Co., Pittsburgh, re-elected.

In his president's address at the opening session on Thursday morning, H. P. Greenwald, director, Region VIII, U. S. Bureau of Mines, Pittsburgh, and retiring institute president, pointed out that while coal is in a tight squeeze now and perhaps in the immediate future, the unprecedented demands for energy in the offing make it necessary for coal to plan on assuming a larger share in supplying that demand. Increased consumption by utilities and steel, the possibility of being called upon to fill existing pipelines with high-Btu gas from coal, prospects for

coal as a chemical-industry raw material, and a possible coal-based liquid-fuels industry all combine in auguring better days for the industry, if the industry will seize its opportunity by expanding coal research and continuing technological progress, Mr. Greenwald declared.

The technical presentation at the opening session was a paper on roof-coating compounds and their use by J. A. Blackburn, mine inspector, Pennsylvania Dept. of Mines, Kittanning, Pa. Mr. Greenwald presided.

ROOF COATING

Roof-coating compounds, seven of which now are accepted by the Pennsylvania Dept. of Mines for use in the mines of the state, are effective in remedying the problems created by the penetration of moisture into certain types of mine roof, Mr. Blackburn stated. The present-day compounds are a result of long study aimed at acquainting manufacturers with the industry's need for such compounds and the problems to be overcome before the coatings could safely be used underground. An eventual result of the studies was a classification of mine roof into three general categories, as follow:

1. Coal roof, characteristic of the Pittsburgh seams, contains numerous fine streaks of inorganic sulfur which rapidly absorb water in the high-humidity season to cause swelling and sloughing.

2. Blue-shale roof, characteristic of the Freeport seams, is soft and rapidly absorbs water through the pores and admits this moisture into the rather wide laminations, especially if shooting has disturbed the roof. Again, swelling and spalling occurs.

3. Pebble roof, characteristic of the Kittanning seams, shows thinly-layered brown shale interspersed with limestone pebbles which are covered with a thin layer of inorganic sulfur. Fine shale dust between the shale laminations and the sulfur streaks combine to make this one of the most troublesome types of roof.

While roof coating is not a panacea, Mr. Blackburn admitted, it has resulted in reduced scaling and roof deterioration where it has been used. Furthermore, the loss of air through stoppings has been reduced, the life of coated timber has been increased in some instances, mine cars and metal roof supports have been made rust-resistant, rib apertures for pin timbering have been protected from the bad effects of moisture penetration, and surface buildings have been coated for their protection.

The use of coatings still requires the prior permission of the mine inspector and the observance of strict rules during application of the materials, Mr. Blackburn concluded.

Safe, economical roof support, using both roof-bolting and conventional timbering was the theme of the Thursday-afternoon meeting. Speakers on the subject of roof-bolting were E. J. Carroll, assistant superintendent, Robena mine, United States Steel Corp., Uniontown, Pa.; and J. L. Rozance, superintendent, Westland mine, Pittsburgh Coal Co., Div. of Pittsburgh Consolidation Coal Co., Westland, Pa. Speakers on conventional timbering were Pennsylvania Mine Inspectors George J. Steinheiser, Uniontown, Pa., and W. R. Cunningham, Johnstown, Pa. Session chairman was J. J. Snure, newly-elected president of the institute.

ROOF-BOLTING

In offering the results of experience with bolting at Robena, where over 125 mi of entry has been bolted, Mr. Carroll declared that safety gets first consideration, with the record to date showing a definite improvement in sections where bolting is practiced, usually the sections having the worst roof conditions. Normal practice calls for the installation of the newest row of bolts at a distance not greater than 30 in from the face, and under special conditions, right against the face. This is in contrast to the 4½ ft of clear space required at the face for precision top cutting when conventional timbers are used. Equipment operators, therefore, have complete roof protection without the added burden of handling face jacks or maneuvering around timbers in loading or tramming.

With bolts not more than 30 in from the face, Mr. Carroll explained, it is possible for an operator to load out an 8½-ft cut without exposing himself to unsupported roof, since the controls are 10 or 11 ft from the gathering arms. Bridging bars at intersections have been bolted to the roof, a practice which in several instances has prevented falls at intersections when bridge-bar posts have been knocked out by machines.

Roof falls have occurred in bolted areas, Mr. Carroll pointed out, but in all instances indications of failure showed up in advance, either as visual evidence in cutting at the ribs or as a humming sound in the bolts.

On the matter of economy, Mr. Carroll advised the use of bolts as permanent roof support even in areas having good roof, if the openings are to be used for a long time as airways or haulageways. Also, in open-end operations it has been possible to increase the width of the open-end cut to 33 ft from an original 25 ft.

A comparative study of experience at three Pittsburgh Coal Co. mines was the theme of the paper presented by Mr. Rozance. At Mine A, roof material generally is a heterogeneous rock cut by many slips and cleavages. At Mines B and C the roof generally is composed of alternate layers of roof coal and slates which are horizontally bedded. In all instances the bolting is designed to provide a more competent roof beam, that is, the roof is not hung from a solid strata, Mr. Rozance explained.

Procedures at all three are similar, with 4-ft holes drilled vertically for the ¾x48-in expansion-shell bolts. Rows are on 4- or 4½-ft centers with the center bolt on the sight line and two flanking bolts from 3 to 4 ft either side of the center bolt.

Industry Meeting—

Special COAL AGE

Staff-Written Report

Drilling is done with rubber-tired Baker-Fletcher electric-hydraulic drills equipped with approved MSA dry dust collectors. Bolts are tightened to a torque of from 160 to 220 ft lb against 6x6x5/16-in steel bearing plates.

The comparative safety record, before and after bolting at the three mines, is as follows:

At Mine A, roof-fall accidents have decreased approximately 50% in the period 1950-53.

At Mine B, 100% bolted now, there has been no roof-fall accident so far in 1953 (Dec. 10) as compared with an average of six in each of the three previous years.

At Mine C, the number of roof-fall accidents increased from four in 1950 to seven in 1952 and 1953. In 1951 only one such accident occurred. Tons per accident remained the same because of large increases in mine production in 1952 and 1953—yet none of these accidents occurred in bolted areas.

The comparative cost record is as follows:

With 35% of the area now being bolted at Mine A, total face costs have decreased 10% between 1951 and 1953.

With 100% bolting at Mine B, face costs have decreased 32% in the same period.

With 35% bolting at Mine C, face costs have decreased 18% in the same period.

In general, Mr. Rozance concluded, the overall production cycle has been made safer and more efficient as a result of the adoption of roof-bolting.

CONVENTIONAL TIMBERING

Leading off with a statistical resume of accident experience in Pennsylvania bituminous during the first 9 mo of 1953, Mr. Steinheiser, who was primarily concerned with roof problems in high-coal areas, pointed out that 48 men lost their lives, 28 in roof-fall accidents. Of the 28 roof-fall fatals, 20 occurred in the high-coal districts. The face area claimed 14; haulageways, 5; and airways, 1. Average age of the victims was 48 yr and average experience was 27 yr. After reviewing the assignment of responsibility for these accidents, Mr. Steinheiser declared that if props and crossbars had been set in time, most of these accidents need not have occurred. All men in the mines should be led to a realization that the foreman who consistently provides sufficient roof-support materials and who insists on the maintenance of safe working places is a better friend to workers and their families than foremen who try to be good fellows by permitting short cuts.

To do the necessary job, Mr. Steinheiser declared, it will be necessary for all inspectors and supervisors to develop within themselves a genuine safety-consciousness, then try to develop similar attitudes in their men.

On the problems of roof support in low coal, Mr. Cunningham laid their greater complexity to the physical characteristics and natural conditions encountered in mining thinner seams. Furthermore, in many instances standard timbering plans

have been violated, and testing by sound and vibration have become automatic to the point of worthlessness. Stressing his belief in the basic value of the vibration method of roof testing, Mr. Cunningham added that close visual inspection also is necessary to forestall roof falls.

Setting forth some ideas for improving the record in low coal, Mr. Cunningham described conditions where clay veins are encountered as cases of "timbering against the worst eventuality." Consideration of the hazards in these clay veins has led to a ruling that crossbars will be installed where clay veins are encountered, regardless of the apparent condition of the roof.

At Bird No. 2 mine, Bird Coal Co., which is working the Upper Kittanning seam, a friable shale began to intrude between the seam and the boney top coal. The boney had given little trouble, but the shale was difficult to hold after it was encountered in thicknesses over 18 in, Mr. Cunningham explained. The ultimate solution adopted by the company officials is to drill one hole into the roof in rooms and aircourses for each cut of coal removed. Two holes per cut are drilled in haulage entries. This has relieved the pressure (some holes have drained water for over a year) to such an extent that the rock now can be held on conventional posting.

Another idea, which Mr. Cunningham credited to W. D. Northover, safety director, Rochester & Pittsburgh Coal Co., Indiana, Pa., is based upon the simple fact that most people dislike writing letters. Now when a supervisor has an accident in his section he must write a letter report to his superintendent, rather than filling a prepared form. Writing the letter in a manner that will answer all vital questions necessitates a full investigation of the accident. The goal is to increase the genuine safety consciousness of all supervisors.

Friday-morning themes included the prevention of accidents in shaft sinking, the future of coal in the Tri-State area, and education for the mining industry. Speakers were S. P. Polack, health & safety engineer, USBM, Pittsburgh; D. E. McElroy, vice president, Pittsburgh Consolidation Coal Co., Pittsburgh; G. R. Fitterer, dean, Schools of Engineering and Mines, University of Pittsburgh; W. N. Poundstone, production engineer, Christopher Coal Co., Pursglove, W. Va., and M. D. Cooper, director, mining engineering education, National Coal Association, Pittsburgh. T. G. Ferguson, institute vice president-elect, was chairman.

SHAFT-SINKING SAFETY

The six most probable sources of shaft-sinking accidents are (1) explosions, (2) explosives, (3) electricity, (4) falling material, (5) suffocation and (6) inundation, Mr. Polack said in presenting a paper prepared in collaboration with W. Dan Walker Jr., chief, Pittsburgh branch, Accident Prevention and Health Div., USBM. In sinking shafts to penetrate coal seams, a methane explosion always is a threat. Limited space and difficult ventilating problems permit rapid accumulation of methane in explosive quantities. Precautions which should be taken to head off such conditions include the authorization of only qualified persons to handle the ventilating system, continuous operation of the fan when men are in the shaft, frequent methane tests and air-volume measurements, and, finally, when methane content approaches 1½%, blasting should be prohibited, electrical machinery taken out of operation, and all men removed from the shaft except those needed to improve the ventilation.

On other safety considerations, the authors advised that misfired holes should be cleaned out by flushing with water, not air; that explosives should be stored, transported and handled with due regard for all safety rules; explosion-proof lighting fixtures should be used where explosive atmospheres are probable or possible; electrical equipment should be properly maintained and sensibly operated and, whenever possible, only permissible equipment should be used.

Falling material is a special shaft-sinking hazard. When men are working above others in a shaft, the men below should be protected by a platform. Buckets containing muck should be trimmed before hoisting, hoist ropes should be adequate for the load and have a safety factor of at least 10, and a fence should be erected around the top of the shaft to prevent material from falling on the men in the shaft.

Finally, care should be taken in forestalling the possibility of inundation. Adequate pumping facilities should be installed and ready to operate.

TRI-STATE COAL PROSPECTS

In commenting on the future of the coal industry in the Tri-State area, Mr. McElroy listed three fundamental factors which will determine that future as: reserves and mining property, personnel and markets. On the matter of reserves, Mr. McElroy viewed the area as being well fixed, with the Pittsburgh seam underlying the entire territory and other seams containing excellent coal having not yet reached the state of development of the Pittsburgh seam. And in addition to the reserves, present knowledge and plans are such that any increase in demand can be met with only one problem to be faced, that is, financing.

Reserves in the ground are of no value without people to consume the coal and others to plan its recovery and produce it. The Tri-State area is fortunate in having progressive management at the head of its coal industry and expert miners on the production line, Mr. McElroy declared.

High-quality reserves and expert personnel notwithstanding, the regional coal industry has a problem in marketing its product, and to some extent this is beyond the control of the industry. A large number of mines and companies are competing for a market that cannot absorb the total productive capacity of the industry, thus forcing some mines out of the picture and forcing others to invest in new equipment to increase efficiency, Mr. McElroy pointed out.

In spite of the competition inherent in the unwise use of natural gas under boilers and dumped foreign oil, there are bright spots in coal's future market possibilities, Mr. McElroy said. Increasing demands for electrical energy, chemicals from coal, pipeline gas and liquid fuels all hold future markets for coal. Other possibilities, as quoted from the Paley Report by Mr. McElroy, include generation of power or some portion of it for the 3,000,000 tons of new aluminum capacity which will be needed by 1975. This could amount to 24,000,000 tons of coal per year. The production of titanium (25 tons of coal per ton of titanium) may demand as much as 30,000,000 tons of coal per year. Ammonia production might possibly require another 10,000,000 tons per year. The Tri-State area is favored by location and facilities to participate in great measure in these brighter markets, Mr. McElroy concluded.

MINING EDUCATION

Concluding feature of the Friday-morning program was a symposium on education for the coal industry, with Dean Fitterer and Messrs. Poundstone and Cooper participating.

"**The mining industry and engineering schools** are faced with a problem which may reach serious proportions in the next 10 yr," Dean Fitterer declared, in pointing out that while enrollment in most other engineering curricula is satisfactory, the decrease in mining-engineering enrollment has been continuous and appreciable. In fact, Dean Fitterer said, if it were not for the veterans returning after World War II, it is doubtful if many of the 30 accredited mining schools would be in existence.

Citing as reasons for this alarming trend, the rumors that coal is through and perhaps the resistance among mining families to sons entering the industry, Dean Fitterer suggested that coal make a realistic survey of its engineering manpower needs for the future, that equipment manufacturers as well as producing companies take steps to interest qualified young men in coal-mine engineering as a profession and that all interested agencies co-operate in getting the facts of the industry's advantages across to young men.

Opportunities for regular advancement should be assured, insofar as possible, and the industry should inform the public that salaries in the industry are comparable with or in excess of those to be had in other branches of engineering.

In describing a new co-operative program at the University of Pittsburgh, Dean Fitterer explained that a qualified student works about 30 hr per week for the co-operating company. He is paid for this work by the company. In addition, he is permitted about 10 hr per week to attend classes at the university. For this he receives no pay. The student registers for from 6 to 10 credits per semester and he pays the tuition fees amounting to about $15 per credit. At the end of each semester he is refunded one-half of his tuition for each course in which he has maintained a grade of

WHY ROEBLING MINING MACHINE CABLES GIVE MORE FOR YOUR MONEY

ANY WAY you look at it, Roebling Roeprene Mining Machine Cables are today's best buy. The ground wire in these cables is made of flat, braided copper so that they have *extra* stretch and flexibility. Then, the neutral is covered with braided cotton which cushions and greatly reduces abrasive action between the copper and the insulation.

And to make sure that all components of the cables are held firmly in place, Roebling employs an additional process and "lead-mold" cures the Roeprene jackets. This curing method also produces a very tough, long-wearing jacket with outstanding resistance to water, acids, alkalis and grease.

Roebling Roeprene Mining Machine Cables are approved by the Pennsylvania Bureau of Mines Approval P-111, and comply with the requirements of the U. S. Bureau of Mines for flame-resistance. They are continuously mold marked for positive identification.

For top efficiency and savings, order Roebling Roeprene Mining Machine Cables from your mining distributor. John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

A subsidiary of The Colorado Fuel and Iron Corporation

ROEBLING

ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. & 5 PITTSBURGH ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • ROCHESTER, 171 [illegible] ST. • SAN FRANCISCO, 1740 17TH ST. • ST. SEATTLE, 900 1ST AVE. S. • ST. LOUIS, 2001 DELMAR BLVD. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, NEW JERSEY

CF&I

ROEBLING

Coal Mining Institute of America . . . Cont'd

"C" or better. At the end of 3 yr, with the student about half-way toward a degree, the company provides another stimulus by refunding the other half of the fees for all courses in which the student achieved a "C" grade. Mining has three students enrolled in the plan, while other industries have 150, Dean Fitterer said.

On the subject of opportunities in the coal industry for young graduate engineers, Mr. Poundstone, a recent honor graduate of West Virginia University, explained that a college diploma does not guarantee a job nor success in the industry. It does, however, help the young graduate to earn these. Further success demands practical know-how as well as engineering theory, Mr. Poundstone continued, in stressing the value of practical mining experience at the face in actual mining jobs. For a better start after graduation, this experience should be gained as much as possible during summer vacations. On the other hand, there are a number of jobs with other than producing companies, in view of the rapid mechanization within the industry and the prospects for new uses for coal.

A review of jobs held by recent West Virginia graduates, as presented by Mr. Poundstone, shows a number of these men holding responsible positions with producers, manufacturers, educational institutions and government agencies. The salaries, in most instances, are above average considering length of service.

The final paper on the subject of mining-engineering education was a report by Mr. Cooper on present status of mining-engineering scholarships. In pointing out that scholarships are investments, or capital put to work, Mr. Cooper explained that a prudent man chooses investments which he believes will return income, even though in this instance the return may consist of satisfaction alone. On the matter of selection of scholarship recipients, Mr. Cooper stressed the fact that need alone is not sufficient. The candidate must be able to meet the terms of the scholarship, he must have the intelligence, enthusiasm and perseverance to profit by the trust that is placed in him, and he should be able to carry college work with better-than-average grades. Scholarships are not hand outs; those who provide the funds expect to get at least a minimum of return in the form of satisfaction in following the careers of the young men who successfully prepare themselves for useful work.

Concerning the number of scholarships now in existence, Mr. Cooper quoted *Commerce Magazine* as reporting some 75,000 scholarships worth $15 million now available to young Americans. Among these are the numerous grants made by coal companies and mining institutes, but as yet there are not enough of these to insure the industry that it will have the trained men it will need in the future.

Facts do not confirm the ideas that coal offers no opportunity, Mr. Cooper said. The coal industry is resilient, always snapping back after a period of stress. Since 1900, there have been 13 period of increasing production varying in length from 2 to 7 yr, and in only one instance has there been a period of decline lasting for as long as 3 yr. In three instances there were declines lasting 2 yr. In 53 yr, therefore, there have been 13 periods of increasing production and only four periods of declining production. In spite of ups and downs in the coal industry, the ups always have been more pronounced than the downs, Mr. Cooper concluded.

Attending the Friday-morning symposium, at the invitation of the institute's education committee, were about 30 high-school students now enrolled in coal-mining courses at Rostraver Township, Pa., and a number of high-school mining students from eastern Ohio.

CONTINUOUS MINING

Continuous mining was the theme of the final session on Friday afternoon. Speakers were G. W. Stump, assistant production manager, Rochester & Pittsburgh Coal Co., Indiana, Pa., and J. H. Truax, superintendent, Harwick mine, Duquesne Light Co., Harwick, Pa. W. P. Powers, vice-president-elect of the institute, presided. Final feature of the 67th annual meeting was a showing of a film covering the operations of the Carbide Miner by J. W. Heimaster, head of mining operations and mining-machinery design, Carbide & Carbon Chemicals Corp., Div. of Union Carbide & Carbon Corp., New York, N. Y. A full description of the Carbide Miner appears in *Coal Age*, December, 1952.

The introduction of continuous-mining machines has brought the desirable goal of concentrated workings to realization, Mr. Stump declared, in explaining how at two of his company's mines, the number of working places was reduced to five in each instance from original totals of 19 places at one mine and 10 at the other. Supervision thereby became more effective and services, such as pumping and ventilation, were materially improved. Speaking of transportation, Mr. Stump reported that at one mine, fully developed by continuous-mining machines, the company is experimenting with a new extensible belt as an intermediate haulage medium. The belt assembly consists of self-propelled head and tail units, with the head unit holding 120 ft of belt which may be paid out as the tail unit follows the mining machine. This permits advancing from 50 to 60 ft before more belt need be added. Individual belt supports are added at 5-ft intervals as the belt increases in length.

With the knowledge that the belt can be operated up to distances of 600 ft, it may be possible to reduce the number of butt headings now required in room-and-pillar mining. Use of the belt will permit increasing the room length from the present 325 ft to 600 ft, thus increasing butt-heading centers from the present 670 ft to 1,220 ft, Mr. Stump pointed out. This will cut development work in half.

Other methods may have to be modified to make fullest possible use of the belt. Rooms now are driven on 25-ft centers with breakthroughs to the butt belt on 50-ft centers. If these centers are continued, Mr. Stump said, some sort of transfer conveyor will be necessary to haul coal from the room which is opposite the main-heading pillar. To eliminate a need for these transfer conveyors, consideration is being given to driving the rooms on 50-ft centers, 31 ft wide. A bridging conveyor would be used between the mining machine and the tail unit of the extensible belt, and rooms would be worked in two lifts.

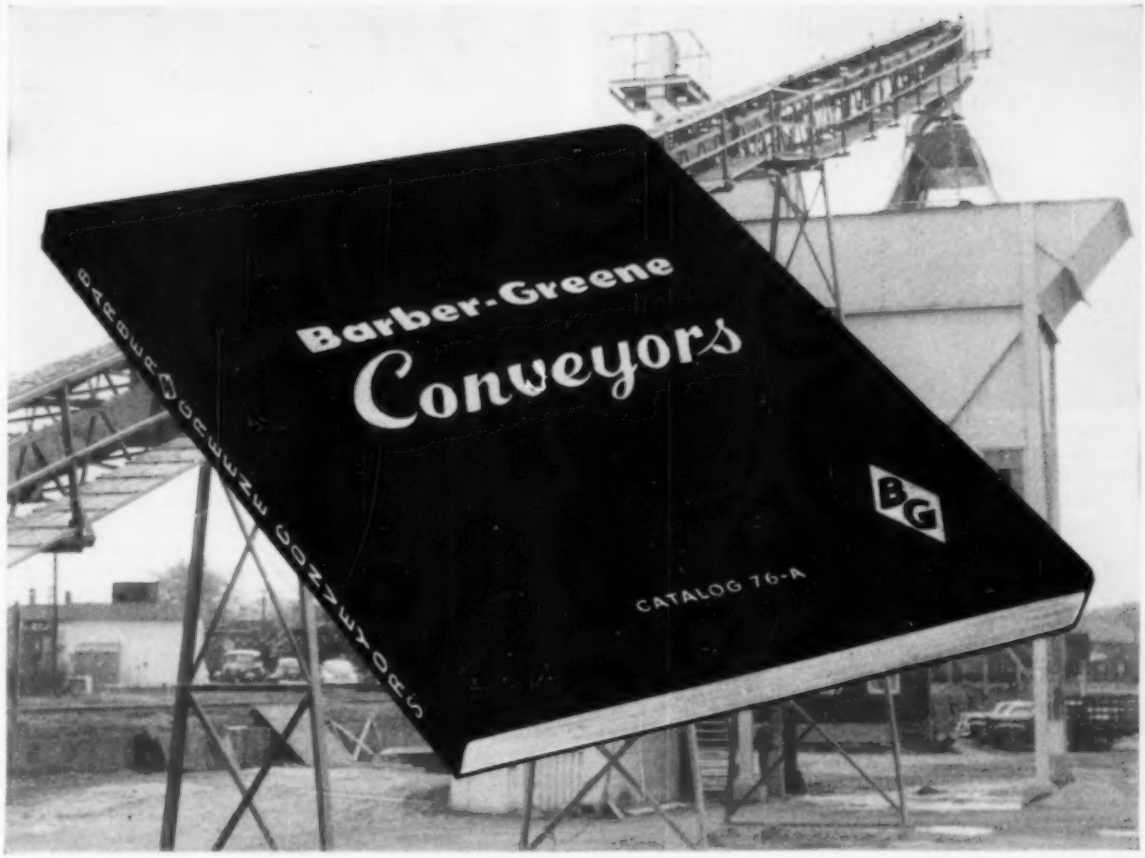
On the other hand, concentration also has drawbacks, Mr. Stump noted, in pointing out that breakdowns have a more damaging effect on production, dust problems are more grievous and supply-handling demands special attention.

Speaking on continuous-mining experience at Harwick, Mr. Truax reported that on the basis of tests performed with a single unit, section costs were reduced 71c per ton in favor of continuous mining over conventional mining, thus leading to a decision to convert to 100% continuous mining. Since the change (July, 1952) tons per man-shift for the total payroll have increased from 6.5 to 10.0. The safety record also has improved. Up to November 15, 1,535,000 tons had been continuously mined without lost-time accidents in the face area. For the 2 yr prior to the conversion, the ratio was one lost-time accident for every 232,860 tons.

Mining methods had to be changed, however, to achieve fullest possible realization of the capacity of the continuous miners. Using slides to illustrate the necessary changes, Mr. Truax pointed out that prior methods of pillar recovery were based upon maintenance of a 45-deg fracture line. This practice required too many moves of the machine, some as long as 400 ft. Adhering to a 45-deg fracture line was abandoned to reduce machine tramming to a minimum consistent with good roof control.

In actual recovery operations, the 86x86-ft pillars are mined by driving successive 15-ft cuts through the block, leaving a 10-ft fender between the worked out area and the 15-ft opening. The fender then is mined leaving small stumps in place to control the roof. Smaller stumps crush out and the larger ones are shot. The second 15-ft drive is made while the previous lift is caving, although the fender is not mined until the cave occurs. If the cave does not come on schedule, the unit is moved to a new place along the fracture line or mining may continue only by permission of the mine foreman. About 85% of the coal is recovered, some of it from places previously considered unminable, Mr. Truax said.

NEWS of your company, personnel changes and other activities, are interesting to other Coal Age readers, so why not make it a point to tell us about them. Write The Editor, Coal Age, 330 W. 42 St., New York 36, N. Y.



If You Handle Bulk Materials You Will Want This New Catalog!

Here's the Most Complete, Comprehensive, Easy-to-Use Conveyor Catalog Ever Published!

Clearly presented in this 192-page book is the broad selection of standardized drives, take-ups, truss, idlers, belting . . . all the components and accessories required to fit your requirements. There are more than 60 pages of typical conveyor layouts and installation photographs. Also included is a section on shuttle conveyors, stackers, feeders and portables.

This catalog clearly and factually demonstrates the savings in design, delivery time, erection and operating costs that Barber-Greene standardization makes possible. Once you use it, you'll have a new conception of the economy, utility and simplicity of Barber-Greene Standardized Conveyors.

WRITE FOR YOUR COPY

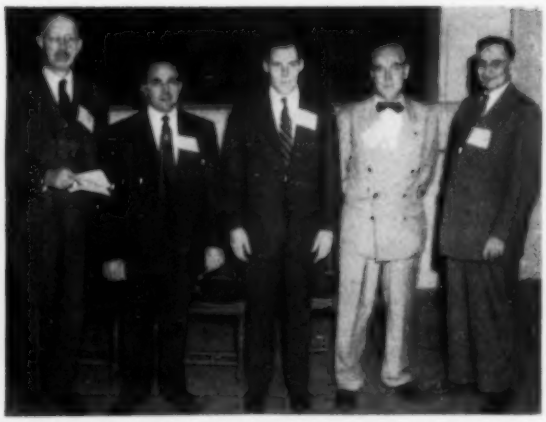
If you handle bulk materials, you'll want this new catalog. Please request Catalog 76-A on your company letterhead.

53-20A-PE

Barber-Greene BG

Aurora, Illinois, U. S. A.

GEOLOGY OF COAL—J. D. Forrester (left), Missouri School of Mines & Metallurgy; Harold M. Bannerman, USGS, Robert Kosanke, Illinois Geological Survey; Oscar L. Haught, West Virginia Geologic & Economic Survey; and Clayton G. Ball, Paul Weir Co.



MINING AND EXPLOITATION OF COAL—L. E. Young (left), consulting engineer; E. R. Phelps, Pittsburg & Midway Coal Mining Co.; W. H. Ireland, Pittsburgh Consolidation Coal Co.; R. E. Doherty, Anthracite Institute; and T. C. Cheasley, Sinclair Coal Co.

New coal conference probes . . .

Coal's Problems and Promises

New group sponsored by Missouri School of Mines scans progress and problems in mining, preparation, utilization and markets. Research is seen as key to present survival and future cash-in on bright promises.

BASIC STUDIES in coal reserves and constituents of coal, problems in mining and preparation and advances in research and utilization were top themes of the First Coal Conference of the University of Missouri School of Mines & Metallurgy held Dec. 3-4 at Rolla, Mo. Over 200 men from coal and allied industries, federal and state agencies and educational institutions registered for the meeting, which was arranged under joint sponsorship of the school, the Missouri Coal Operators' Association and the Missouri Geological Survey.

STUDYING SEAMS, TREATING ASH

Paleobotany, the science of fossil vegetation, soon may become a reliable key to identification and correlation of coal beds, said Robert Kosanke, Illinois Geological Survey. Mr. Kosanke, whose paper was the first presented at the opening session Thursday morning, followed J. D. Forrester, chairman, Department of Mining Engineering of the school, who welcomed the conference as an opportunity to stress the industrial significance of coal and the role of Missouri's coal reserves in the Nation's economy. Harold M. Bannerman, assistant chief geologist, U. S. Geological Survey, presided at the session.

The relative abundance of the microspores of various vegetable fossils in coal already has indicated the correlation of several Illinois seams, Mr. Kosanke reported. Staking out new ground in this kind of research, he based his studies mostly on species identification of microspores—a method which, though more difficult than identification by genera, gives promise of more accuracy. Useful fossils include sphenopsida, megaphyta, gymnosperma, lepidodendra and calomyta. The work still is in its early stages, Mr. Kosanke pointed out, but it may prove valuable not only in seam identification but also in estimating coal reserves.

Rare and sparsely distributed elements, now finding new industrial uses, may be present in coal in quantities sufficient for profitable extraction, said O. L. Haught, geologist, West Virginia Geological & Economic Survey, who presented a paper prepared jointly with A. T. Cross, his associate. Mr. Haught warned, however, that analyses of coal ash indicate that it cannot now be processed profitably for recovery of any single element. He cautioned further that the known uses of such rare ash-contained elements as germanium, gallium and rubidium are limited and that their prices are sensitive to over-supply. At best, commercial recovery of minor elements like these will be practicable only on a large scale—at a steam-electric plant, for instance. Meanwhile, dust collected from industrial stacks may prove to be more valuable than ash as a source of minor elements.

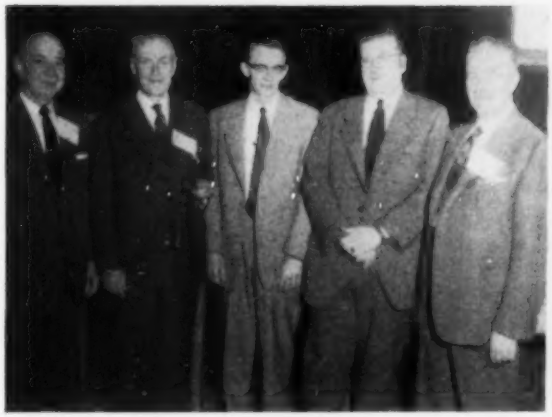
Within the next 10 yr, commercially practicable ways may be found to extract these valuable minor elements from ash, Mr. Haught predicted. Potash may lead the way. The ash of West Virginia coals, for example, contains about 33 lb of potassium oxide per ton, with a present wholesale price of about $1, Mr. Haught pointed out.

INDUSTRY MEETING — A Special COAL AGE Staff-Written Report

MEASURING COAL RESERVES

Insufficient data on coal reserves are delaying development of new coal operations and new industrial areas, said Clayton G. Ball, vice president, Paul Weir Co. Lack of data makes it risky for mining companies to open new mines except in areas where the experience of neighbors already has brought the needed facts to light.

The effect of current re-appraisals of the Nation's coal reserves, being undertaken by the U. S. Geological Survey, the U. S. Bureau of Mines, the Army Corps of Engineers and state mining departments, is to scale down earlier estimates, Mr. Ball said. The latest USGS estimate, as of 1950, figures coal reserves in place at about 2,000 billion tons, with somewhere between 800 and 1,000 billion



PREPARATION—A. J. Snider (left), University of Missouri; M. D. Cooper, National Coal Association; R. C. Ellman, USBM; C. J. Potter, Rochester & Pittsburgh Coal Co.; and H. R. Hagen, Philadelphia & Reading C. & I. Co.

UTILIZATION AND MARKETS—David T. Beals (left), Crowe Coal Co.; John K. Bryan, Union Electric Co. of Missouri; E. C. Medcalf, American Cyanamid Co.; and H. J. Rose, Bituminous Coal Research, Inc.

tons recoverable. These figures are about one-third less than earlier estimates.

Expressed in percent of total calorific availability, reserves are distributed somewhat as follows, Mr. Ball said: Appalachian Trough, 20.2% bituminous and 0.6% anthracite; Eastern Interior, 11% bituminous; Western Interior, 1.1% lignite and 8.8% bituminous; Far Western, 20.6% lignite, 21.9% sub-bituminous and 15.8% bituminous.

Predicting tremendous markets for the future, Mr. Ball entered a plea for more data on individual seams, seam continuity, partings, faults, roof conditions, adjacency of water and other matters. In the years ahead, he predicted, mining methods will be much the same as they are today, since new machines and tools must be tested over a long time and new extractive methods, such as underground gasification, still are experimental and must await more information on gas utilization. If the needed facts are brought to light, increases in coal production may occur in regions not now fully developed, Mr. Ball declared.

FUELS POLICY—Tom Pickett (left), National Coal Association, with Dean Curtis L. Wilson, Missouri School of Mines.

STRIPPING MOVES FORWARD

From lowly beginnings, the coal-stripping industry has advanced to almost unbelievable heights, said Edwin R. Phelps, vice president, Pittsburg & Midway Coal Mining Co. Mr. Phelps was the first speaker Thursday afternoon, with Dr. L. E. Young, consulting mining engineer, presiding.

Touching lightly on massive and novel machines for removing overburden —for example, the wheel excavator, the tower excavator and the car transporter— Mr. Phelps disclosed the various steps and problems involved in setting up and operating a strip mine. These steps and problems include: (1) field inspection and land acquisition which, in these days, is complicated by the high cost of farm land; (2) prospect drilling, for which giant new auger and rotary drills now are available; (3) mapping, in which new techniques provide accuracy for locating coal areas, drill holes, depth and thickness of overburden and coal, and provide help in plotting pit layouts, digging procedures, electrical distribution, roads and drainage ditches; (4) selection of excavating equipment, which is determined by many factors, including ratio of overburden to coal, type of cover, pitch of the seam, the need for box-cutting and the possibility of two-seam mining; (5) power distribution; (6) drilling and shooting, for which new types of equipment provide larger holes and wider spacing between holes; (7) pumping and drainage; (8) loading coal from the pit, which requires size correlation between loading and haulage units; (9) haulage equipment and roads, for which power steering, power brakes, torque converters and automatic transmissions now are available; (10) radio, which speeds communication and saves time; (11) maintenance and safety, which lower costs and improve employee-employer relations; (12) new-type mining equipment, such as the big pit auger and the Carbide miner; and (13) land reclamation.

MINING BITUMINOUS UNDERGROUND

Solution of still unsolved or only partly solved problems associated with recent advances in deep mining will bring new increases in productivity and better safety, said S. M. Cassidy, vice president, Pittsburgh Consolidation Coal Co., whose paper was presented by M. H. Ireland, of the same company.

The following operating problems now are of greatest concern to the industry and their solution will produce most benefits in the future, Mr. Cassidy stated:

1. Continuous mining—Two types of machine—one with ripper action, the other with boring action—appear to hold most promise for the future. The major drawback of most designs is the inability of the machines to make a good clean-up, especially those that must make a second cut to widen the place. Some manufacturers now are working on this problem. Other problems common to all continuous miners are man space on the sides and timbering space above; ability to drive a room or make a pillar lift by remote control; development of extensible conveyors; and full utilization of the coal plow and the long auger, especially in thin seams.

2. Roof bolting—Many problems, such as dust control, bit wear and rotary drilling in hard rock have been solved. But others remain, namely: the high cost of bolting materials and the installation of bolts above continuous miners. Some progress is being made in solving these problems.

3. Full-seam mining—Full-seam mining has spread slowly, mostly because of inadequate cleaning-plant facilities, and costly selective mining therefore still prevails in many of those mines where full-seam mining would be most advan-

(Continued on p 148)

Obituaries

GEORGE A. ROOS

George A. Roos, 62, since 1947 vice president, operations, The Philadelphia & Reading Coal & Iron Co., died Nov. 29 at his home in Pottsville, Pa. Joining the company as a blacksmith's helper, following studies at Drexel Institute, Mr. Roos would have completed 50 yr of service with P & R this month. He had been a member of the Anthracite Board of Conciliation since 1943 and its chairman since 1951. He also was serving as chairman of the State Mine Inspectors Examining Board. During his long career with P & R, Mr. Roos held various supervisory and operating posts. He was named assistant general manager in 1928 and served as general manager from 1937 to November, 1947, when he became vice president in charge of operations.

D. H. PAPE

D. H. Pape, 69, president, Sheridan-Wyoming Coal Co., Inc., Monarch, Wyo., prior to his retirement, died Nov. 20 in Santa Monica, Calif. For many years a director, and at one time an official of the National Coal Association, Mr. Pape had been engaged in retail and wholesale segments of the industry in the east, and officially connected with the operating end in Utah, West Virginia and Wyoming. Mr. Pape headed Sheridan-Wyoming from 1937 until his retirement Dec. 31, 1947, after nearly 50 yr of service to the industry.

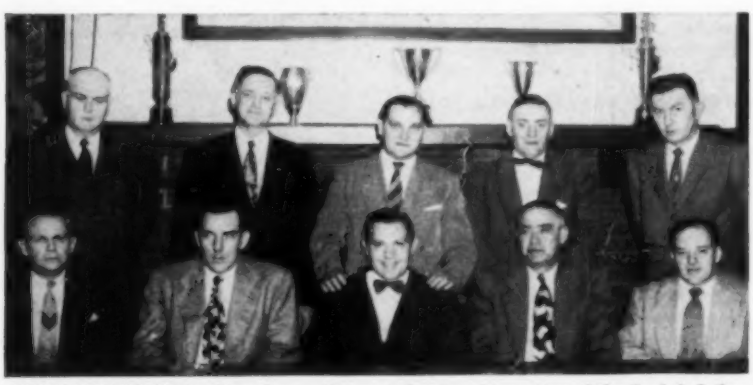
Henry Woodeshick, 56, mine foreman, Stanton colliery, Glen Alden Coal Co., Wilkes-Barre, Pa., died Nov. 26 at the Moses Taylor Hospital, Scranton.

CHARLES A. VIGNOS

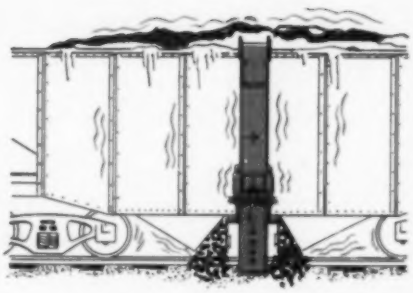
Charles A. Vignos (right), 86, president of the American Mine Door Co., died Dec. 1 following a heart attack at his home in Canton. Associated with the company since 1917 as manager, when his father was president, he contributed greatly to the company's stature, adding many new safety devices and general mine equipment to the production of mine doors. He was widely known throughout the mining industry.

Illinois Mine Rescue Post Meets

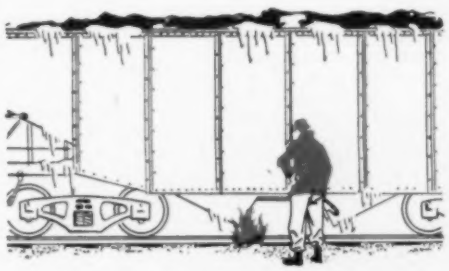
NEWLY ELECTED OFFICERS for 1954, Fred J. Bailey Post No. 4, National Mine Rescue Association, Benton, Ill., (left photo) are: Standing, J. R. Summary (left), assistant secretary, and Coy L. South, secretary-treasurer. Seated, George Stachura (left), vice president, and L. H. Johnson, president. At right, C. M. Walker (left), presents an honorary membership certificate to John Lyons, retired saftey engineer, Bell & Zoller Coal & Mining Co., Zeigler, Ill.



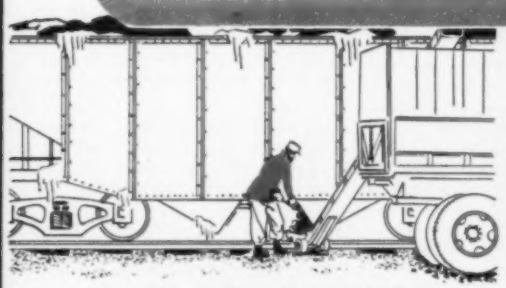
PRINCIPAL SPEAKERS, old and new officers at the Nov. 21 meeting of the Fred J. Bailey Post No. 4, are: Standing, C. M. Walker (left), safety engineer, Chicago, Wilmington & Franklin Coal Co., and retiring Post president; W. R. Chick, coal mine inspector, USBM; George Stachura, superintendent, Chicago, Wilmington & Franklin Coal Co., new vice president; and L. H. Johnson, safety engineer, Peabody Coal Co., new president. Seated left to right: Mac Davis, USBM; Coy L. South, coal mine inspector, USBM, secretary-treasurer; John Stachura, superintendent, Enos Mining Co.; W. W. Kessler, coal mine inspector, USBM; J. R. Summary, mine inspector, USBM, assistant secretary-treasurer.



NO SHAKING



NO THAWING



NO DELAYS

when coal is

FREEZE-PROOFED *with* PERMATREAT

Ashland PERMATREAT is a specialized oil product which, when sprayed on coal, prevents freezing in the car and hoppers. It speeds up the de-watering process, rain and melting snow runs off and out of the load. Removing the water minimizes the effect of freezing. Some operators give a couple of shots of PERMATREAT Coal Spray in the bottom of the hoppers as further protection. This lets coal break loose easily without need for thawing or shaking.

PERMATREAT also protects coal from the deteriorating effect of moisture, air and bad weather. Coals stay brighter, fines do not settle in the load or in the stockpile. PERMATREATED coals are more acceptable for both industrial and home heating uses.

Ashland's coal preparation engineers are available to help with your oil-treating problems. Call or write for further information.

Ashland
PERMATREAT
COAL SPRAY
Seals in Dust

FOR YOUR

PERSONAL CAR

ASHLAND OIL & REFINING COMPANY
Ashland, Kentucky
Phone 1860

News Briefs . . . From p. 112

gas. In its findings, released Dec. 3, the board unanimously held that the director of the USBM had failed to satisfy the statutory burden of proof to show that the mine in fact contained 0.25% or more of methane as required for a gassy classification under the law. In this connection the board said, "The Board is of the opinion that where, as in this case, the finding is extremely close to the statutory figure of 0.25 per centum and where the laboratory records show that there is a possibility of the presence of other combustible gas, the Director is under a duty to show affirmatively that the finding is based solely on the required quantity of methane and that no other combustible gas was present, or if present, did not sufficiently affect the result of the analysis so as to bring the result below the statutory figure of 0.25 per centum."

West Kentucky Coal Cites Basis for UMWA Contract

Following the announcement Dec. 18 by Mark E. Eastin, vice president of the West Kentucky Coal Co., that the company would sign a labor contract with the UMWA, Hooper Love, company president, made the following comment:

"We feel that the signing of a labor contract on behalf of our production employees with the UMWA is a constructive move and one which will make it possible for us to proceed with plans for greatly enlarging the scope of the company's activities.

"It is our intention to make the company's labor relations a model in the industry. It will be our earnest desire to preserve the existing splendid relations with our men and the good people of this community.

"The new labor policy of West Kentucky Coal Co. is in keeping with that prevailing the vast majority of the industry, including such other large and successful producers as Pittsburgh Consolidation Coal Co., U.S. Steel Corp., Bethlehem Steel Corp., Island Creek Coal Co., Truax-Traer Coal Co., West Virginia Coal & Coke Co. and many others."

$10,000 Reward Offered for Leads on Tipple Dynamiting

G. Albert Stewart, executive secretary of the Central Pennsylvania Coal Producers' Association, announced last month a $10,000 reward for information leading to the arrest and conviction of persons responsible for dynamiting the tipples of the Bradford Coal Co., Bigler, Pa., and the Diamond T. Stripping Co., Philipsburg. Damage is estimated at $50,000. There have been 27 similar incidents in central Pennsylvania in the last few years, Mr. Stewart pointed out.

Anthracite Committee Named To Push Drainage Project

Members of the 6-man Anthracite Mine Drainage Study Commission, as provided for in 1953 legislation, were named by Pennsylvania Gov. John S. Fine Dec. 10. At the same time, the state Department of Mines reported that installation of pumps to control flooding of abandoned mines in the Wyoming region would get underway within 90 days. The committee, which is headed by William J. Clements, Pennsylvania Secretary of Mines, is expected to spur action on the general drainage program sponsored by the state. Other members are: Edward G. Fox, president, Philadelphia & Reading Coal & Iron Co.; Edgar C. Weichel, vice president, Hudson Coal Co.; Francis O. Case, President, Glen Alden Coal Co.; August J. Lippi, Joseph T. Kershetsky and Mart F. Brennan, presidents, respectively, Districts 1, 9 and 7, UMWA.

EQUIPMENT APPROVALS

Six approvals of permissible equipment were issued by the U. S. Bureau of Mines in November, as follows:

Joy Mfg. Co.—Type 14BU-8CE loading machine; four 15-hp motors, 250 v, DC; Approval 2-965; Nov. 3.

Jeffrey Mfg. Co.—Type 76-8 Colmol mining machine; one 50-hp and two 70-hp motors; 440 v, AC; Approval 2-966A; Nov. 9.

Joy Mfg. Co.—Type U-179-20PE chain-conveyor drive unit; 15-hp motor; 250 v, DC; Approval 2-967; Nov. 18.

Jeffrey Mfg. Co.—Conveyor drive unit; 30-hp motor; 380 v, AC; Approval 2-968A; Nov. 18.

Joy Mfg. Co.—Types 10SC4BPE-1 and 10SC4BPXE-1 cable-reel shuttle cars; two 5-hp and three 15-hp motors; 250 v, DC; Approval 2-969; Nov. 19.

Joy Mfg. Co.—Type WL82B Model 50 air compressor; 50-hp motor; 250 v, DC; Approval 2-970; Nov. 30.

Mine Fires in Three States

Fires causing extensive damage at three mining properties were reported last month. On Dec. 12, a tipple at Norton, Va., owned by the Coal Processing Corp., was destroyed by a fire that caused an estimated damage of $100,000. The plant had been in operation about 10 yr and had an output of some 1,500 tpd. At Cardinal, Ky., a fire Dec. 7 destroyed the tipple and washing plant of the Kentucky-Cardinal Coal Co. Replacement cost is estimated at $350,000. At Olcott, W. Va., Dec. 8, a fire swept through the main office building, commissary and four homes belonging to the Black Band Coal Co. In the absence of community fire-fighting equipment, residents formed a "bucket brigade" to fight the flames.

And For Your Information . . .

A new cause for a strike appeared at a Scottish mine last month. Some 800 workers threatened to strike unless management forced one of their members to take his first vacation in 12 yr. Union officials said they had been working for years to get a 2-wk paid holiday and the reluctant worker was "letting his mates down."

Several Utah coal companies last month announced a 50c increase in the price of their industrial coal. The Independent Coal & Coke Co. and the Spring Canyon Coal Co. were first to announce the boost and others were expected to follow. Companies reported they now were losing money by giving the coal away and could no longer operate that way.

In line with its general policy of expanding its activities in moving coal on the Ohio River, the Island Creek Coal Co., through its transportation subsidiary, has recently added 24 new barges and a motor vessel to its river fleet.

Association Activities

AIME to Hold Annual Meet

The AIME will hold its annual meeting Feb. 15-18 at the Hotel Statler, in New York City.

AMC Names Salvati

At the annual meeting of the American Mining Congress held in New York Dec. 2, Raymond Salvati, president of the Island Creek Coal Co., was elected a vice president, and George B. Harrington, president of the Chicago, Wilmington & Franklin Coal Co., was re-elected to the AMC executive committee. Howard I. Young, president, American Zinc, Lead & Smelting Co., was re-elected AMC president, and Julian D. Conover was re-elected executive vice president and secretary.

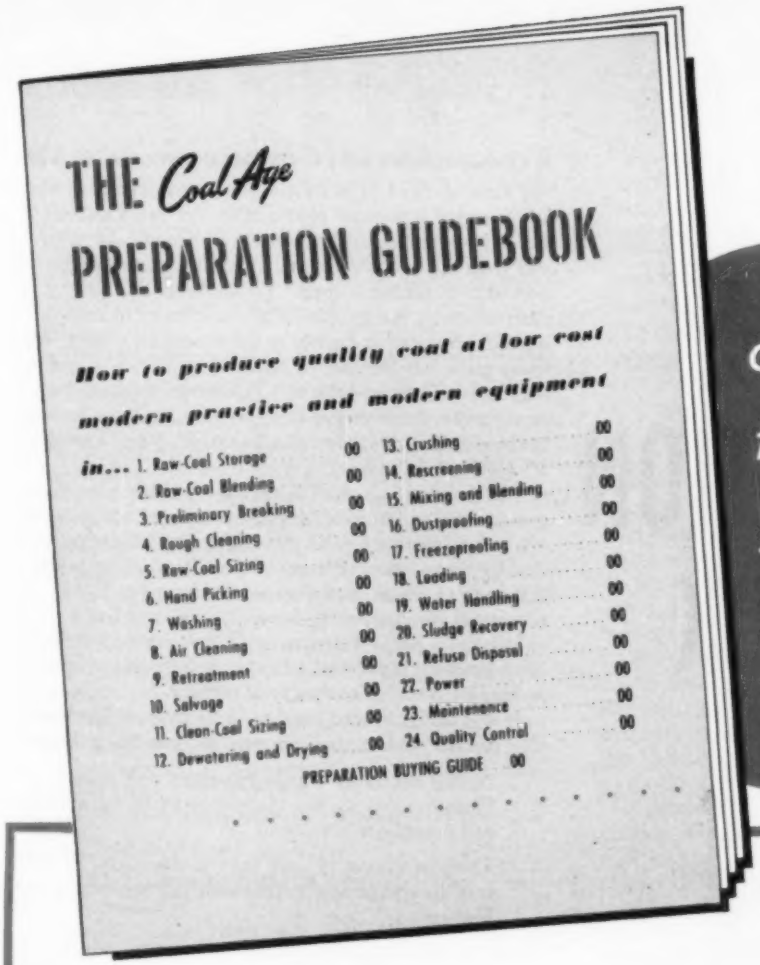
Rescue Groups Name Officers

Henry C. Rose, president, Pittsburgh Coal Co., Div. of Pittsburgh Consolidation Coal Co., has been elected president of the Mine Rescue Veterans' Association, succeeding A. J. Nairn. H. R. Burdelsky, USBM, was named vice president. Named president of the National Mine Rescue Association was George C. Trevorrow, general superintendent, Harmar Coal Co.; and vice president, William P. Powers, Pennsylvania mine inspector. Reese H. Nicholas, retired safety director for the Pittsburgh Coal Co., was re-elected secretary-treasurer of both organizations.

Fox on Conciliation Board

Representatives of anthracite producing companies of the southern anthracite region Dec. 14 elected Edward G. Fox, president, Philadelphia & Reading Coal & Iron Co., to represent them as an industry member of the Anthracite Board of Conciliation. He succeeds the late George A. Roos, vice president in charge of operations for P&R. Acceptance of this post by the president of P&R highlights the importance with which management as well as labor views the work of the Board of Conciliation, the company points out. Other industry members of the board are Edgar Weichel, vice president, the Hudson Coal Co., representing the northern field, and Evan Evans, board chairman of the Lehigh Navigation Coal Co.

More on p. 132



coming to you in March Coal Age

A PERMANENT REFERENCE GUIDE-BOOK for planning new preparation plants, plant additions or changes in present plants.

FUNDAMENTAL INFORMATION on *what's being done* to meet modern requirements for efficient, low cost coal preparation. *Why it's being done* and *how* it is accomplished.

PLUS a convenient buyers guide listing the manufacturers of equipment and materials generally used in coal preparation.

PLUS advertisements explaining how specific equipment and materials can help you meet modern requirements for efficient, low cost preparation with low impurity content, proper sizing and uniformity.

AND THE MARCH ISSUE of COAL AGE will contain all the departments and editorial features contained in every issue of COAL AGE.

COAL AGE WILL PRESENT IN MARCH

THE *Coal Age* PREPARATION GUIDEBOOK

Today, more than 50 percent of bituminous coal production is mechanically cleaned in 650 preparation plants. Five years ago, only 30.2 percent was cleaned in 502 plants.

This pronounced increase is due to the demand for better coal quality to meet the competition of other fuels and the competition of individual firms within the industry.

Modern, efficient, low-cost preparation may mean the difference between showing a profit and going out of business. That's why every coal operating official should be interested in coal preparation. That's why COAL AGE is presenting "The COAL AGE Preparation Guide Book" in the March issue. To give you the fundamental facts – in one place – as a guide for planning new preparation plants, plant additions or changes in present plants.

COAL COMPANIES PROFIT

CASE HISTORIES,

1. Consolidation Coal Co. (W. Va.), Fairmont, W. Va.

"In these days of high freight rates and expensive handling, many industrial coal consumers are successfully meeting the challenge of fuel costs through the savings and increased efficiency that come from well-prepared high-Btu bituminous coal. To increase our ability to meet this need, we have built the most modern coal-mining and preparation facility in the Fairmont region. Williams mine has the largest production potential and the longest life expectancy of any Pittsburgh-seam operation in northern West Virginia." – *George R. Higinbotham, President, Consolidation Coal Co. (W. Va.), Fairmont, W. Va.*

The preparation plant is the latest in a series of improvements and new developments initiated immediately after its formation by the Pittsburgh Consolidation Coal Co. Its completion represents the $91 million point in Pittsburgh Consol capital expenditures since 1946. The company, throughout its five divisions, now has 17 new or improved preparation plants. These serve 25 modernized mining operations, or all the long-life properties producing coal for commercial markets.

It was designed and built by the Fairmont Machinery Co. "Firsts" and unusual features include the following:

1. Unlike any other Pittsburgh-seam operation in the Fairmont region, two distinct types of wet-washing equipment are employed.
2. Thermal drying is used for the fine sizes, in addition to centrifugal drying and normal dewatering screens.
3. Liberal extra space has been provided and the design tailored to permit rapid expansion of preparation capacity by the addition of another Chance cone, additional Deister SuperDuty Diagonal-Deck tables, and additional centrifuges and thermal-drying equipment.
4. Enclosed modern design has resulted in employees christening the plant the "Williams Windowless Wonder." Construction is steel and concrete, and the plant occupies slightly over an acre, with the equivalent of 3 acres in its eight operating levels extending up to 100 ft. above ground level.
5. Special features include a vacuum dust-collection and ventilating system, fluorescent lighting, elevator serving all operating levels and a loud-speaker system.

---

2. Pocahontas Fuel Co., Inc., Itmann, W. Va.

Adding a potential output of 2,000,000 tons per year to the productive capacity for the "Original Pocahontas" coal produced by Pocahontas Fuel Co., Inc., now rated at 7,000,000 tons annually, the new 760-tph Itmann plant, at Itmann, W. Va., was timed to take advantage of the new developments that have come along in coal preparation. Plant design was deferred until these new developments could be proved by experience, which pro-

vided an opportunity for building a plant modern in all respects and specifically equipped to provide the maximum in quality and uniformity.

The new Itmann plant began service Feb. 12, 1951, and features, among other new developments, picking out rock and breaking lump to 7 in., pre-drying and air-cleaning 3/16x0 and washing 7x3/16 in heavy-media equipment.

3. Red Jacket Coal Corp., Red Jacket, W. Va.

To produce the best coal possible – a real premium coal – was the objective of officials of the Red Jacket Coal Corp., Red Jacket, W. Va., in planning the new No. 17 preparation plant in consultation with engineers of the Roberts & Schaefer Co., which handled the design details, fabrication and erection.

With the main section of the 350-tph plant in operation since last May, that goal has been achieved for sizes above 3/16 in. and the resulting premium products are being marketed as "Southern Belle Coal." Completion of a pre-drying and air-cleaning addition to be built soon will upgrade the 3/16x0 carbon from a medium to good-quality steam coal to a premium by-product coal. Working two continuous seams simultaneously, this newest Red Jacket operation will supply 25 to 27 million tons to the new plant.

4. Black Star Coal Corp., Alva, Ky.

What can a modern preparation plant do for an operation?

Increased running time in a rather static domestic market and a growth in production that makes its property one of the four largest in Harlan County are among the benefits derived from the new plant of the Black Star Coal Corp., Alva, Ky. Designed primarily for making premium stoker coal, the new washing plant is handling 250 tph of 5x0-in. coal, with a reject of 10%.

Utilizing an air-operated jig and centrifugal and flash driers, the Black Star plant cut the ash in its stoker coal from the previous 7 to 8% down to 2½ to 3%, and has reduced the ash in the carbon from 12 to 13% formerly to 6 to 7%. Among other features is a horizontal centrifugal filter installed to clarify and conserve water.

Mechanical loading in the Black Star mines began on an extensive scale in 1946 with installation of Joy 14 BU loaders and Joy 32-E shuttle cars. About that time, or shortly afterwards, dirtier coal was encountered in the workings. Considering everything, a cleaning plant loomed as a necessity – to permit complete mechanization, place the coal in better markets and provide better running time.

The new washing and drying plant that resulted was located in a separate steel building adjacent to the existing steel tipple, which has extensive screening, crushing and mixing facilities. The new plant, designed and built by the McNally-Pittsburg Mfg. Corp., went into operation in April, 1950. The improvement has enabled the Black Star operation to become one of the four largest producing mines in Harlan County. Including Black Star, four mines in the county now are equipped with mechanical-cleaning plants.

5. Dawson Daylight Coal Co., Dawson Springs, Ky.

Recovering ¼x0 coal formerly partially wasted, stepping up screening performance, and reducing the number of screen changes are top benefits derived from three heated-screen vibrator units installed at the New Daylight preparation plant of the Dawson Daylight Coal Co., Dawson Springs, Ky.

6. Beaver Brook Coal Co., McAdoo, Pa.

Dual-gravity separation of sizes from stove through buckwheat in a single vessel is one of the latest developments in anthracite preparation practice. Proud owners of the new installation, Beaver Brook Coal Co., McAdoo, Pa., report that their Wemco Mobil-Mill with a two-compartment drum separator rated at 100 tph, is satisfactorily converting feed from deep strippings or banks into three fractions: (1) clean Lehigh anthracite, (2) stripped-clean refuse and (3) a middlings product which is crushed and recirculated through the drum of the Mobil-Mill to insure highest possible yield from the feed.

Furthermore, the new plant at the company's Redco colliery features a medium-reclamation system which is equipped with only a single densifier. Thus, the two-compartment drum contributes to more economical operation in three important ways: fewer pieces of equipment are needed, construction and installation costs are lower and a minimum of floor space is required.

7. Lehigh Navigation Coal Co., Lansford, Pa.

New auxiliary unit at Coaldale cleaning plant is equipped with a 2-car rotary dump to permit one car of rock to be dumped while another is cleaned inside by a high-pressure water spray. The benefits are increased car capacity and lower overtime labor costs.

8. Reidinger Coal Service, Paxinos, Pa.

All cleaning plants are not big ones. There's a small-business side to the industry, too. One of the better examples in anthracite is the Reidinger Coal Service plant at Paxinos, Pa. Operated by Victor Reidinger, a 24-yr. veteran in coal, the plant cleans and sizes deep-mined Lykensvein coal purchased from several independent operators in the Paxinos area. The major cleaning units are a Wilmot Simplex Type D jig for stove and nut sizes and a pair of 2-ft. Menzies cones for the smaller sizes.

In business for himself since 1946, when he purchased an old plant and the site on Route 122 between Shamokin and Sunbury, Mr. Reidinger points out there always is some improvement you can make. Since 1946, the plant has been substantially rebuilt. Now he looks forward to the addition of another cone to help clean pea and buckwheat and thus ease the load.

SOME OF THE COAL COMPANIES WHO HAVE CONTRACTED FOR MODERN PREPARATION PLANTS OR EQUIPMENT IN 1953*

(January-October)

As reported to COAL AGE by preparation plant designers and equipment manufacturers

Pocahontas Fuel Co., Inc., Mine #31, Amonate, Va.
Imperial Coal Corp., Cambria mine, Coalport, Pa.
Ebensburg Coal Co., Colver mine, Colver, Pa.
Page Coal & Coke Co., Pageton, W. Va.
Stonega Coke & Coal Co., Appalachia, Va.
Lynnville Coal Co., Buckskin, Ind.
Mathies Coal Co., Mathies mine, Courtney, Pa.
Rochester & Pittsburgh Coal Co., Ernest mine, Ernest, Pa.
Reidinger Coal Co., Paxinos, Pa.
D & Z Coal Co., Shamokin, Pa.
Truax-Traer Coal Co., Velva, N. D.
Harmar Coal Co., Harmarville, Pa.
United States Steel Corp., Alpheus plant, Gary, W. Va.
Kentucky Fuel Co., Hellier, Ky.
Stoudt's Ferry Preparation, Leesport, Pa.
Rochester & Pittsburgh Coal Co., O'Donnell mine, Four States, W. Va.
Rochester & Pittsburgh Coal Co., Kent #1-2 mine, McIntyre, Pa.
Compass Coal Co., Elk Creek mine, Philippi, W. Va.
Consolidation Coal Co. (W. Va.), #32 mine, Owings, W. Va.
Pennsylvania Water & Power Co., Safe Harbor, Pa.
Oglebay, Norton & Co., O.K. Coal, Inc., N. Industry, Ohio
W. P. Stahlman Co., Corsica, Pa.
Wynn Coal & Coke Co., Fairchance, Pa.
Crescent Coal Co., Central City, Ky.
Jenkins Coal Mining Co., Earlington, Ky.
Joanne Coal Co., Rachel, W. Va.
Denise Coal Co., Somerset, Pa.
Clearfield Bituminous Coal Corp., Indiana, Pa.
Roslyn Cascade Coal Co., Ronald, Wash.
Ozark Philpott Mine, Ozark, Ark.
Nugent Mining Co., Luthersburg, Pa.
David Z. Norton Co., #3 mine, Powhatan, Ohio
Penag Coal Co., Good Springs, Pa.
Schneck Coal Co., Suedburg, Pa.
Republic Steel Corp., Spaulding mines, Spaulding, Ala.
Jewell Ridge Coal Corp., Blair Fork mine, Delphia, Ky.
Johnstown Coal & Coke Co., Logan #3 mine, Beaverdale, Pa.
United Electric Coal Cos., Chicago, Ill.
Valley Camp Coal Co., Alexander mine, Elm Grove, W. Va.
Sycamore Coal Co., Cinderella, W. Va.
Alabama Power Co., Barry Steam Plant, Mobile, Ala.
United States Steel Co., Robena mine, Greene County, Pa.
Swatara Coal Co., Minersville, Pa.
Diminick Coal Co., Paxinos, Pa.
State of Tennessee, Petros, Tenn.
South Union Coal Co., #11 mine, Edna, W. Va.
C. M. Bixler, Valley View, Pa.
Atkins Coal Co., Frackville, Pa.
Bell & Zoller Coal & Mining Co., Johnson City, Ill.
Altmire Bros. Coal Co., Inc., Apolla, Pa.
William Aloe Coal Co., Imperial, Pa.
Pine Creek Coal Co., Spring Glen, Pa.
Milburn By-Products Co., Milburn, W. Va.
West Virginia Coal & Coke Corp., Dorrance Colliery, Omar, W. Va.
Seminole Coal Corp., Lenzburg, Ill.
Harlan Fuel Co., Yancey, Ky.
Oglebay, Norton & Co., Richwood-Sewell Coal Co., Burton mine, Allingdale, W. Va.
Peabody Coal Co., Harco, Ill.
Rochester & Pittsburgh Coal Co., Lucerne mines, Pa.
Clinchfield Coal Corp., #9 mine, Clinchco, Va.
Crucible Steel Co. of America, Crucible, Pa.
Lion Coal Co., Wattis, Utah
Banner Fuel Corp., Toms Creek, Va.
Gilberton Coal Co., Gilberton, Pa.
Kentucky Fuel Co., Hellier, Pike Co., Ky.
Russell Fork Coal Co., Mikegrady, Ky.
North Branch Coal Corp., Kitzmiller, Md.
Jacob's Fork Pocahontas Coal Co., Squire, W. Va.
Tasa Coal Co., #8 mine, Zelienople, Pa.
Glen Alden Coal Co., Woodward Colliery, Kingston, Pa.
Blue Diamond Coal Co., Leatherwood #2 mine, Tilford, Ky.
Eastern Gas & Fuel Associates, Wharton #2 mine, Wharton, W. Va.
Pocahontas Fuel Co., Inc., Bishop #33-34 mine, Bishop, Va.
Centralia Mining Co., Centralia, Pa.
Bridgeview Coal Co., Fayette Co., Pa.
Mahan-Ellison Coal Corp., Lancing, Tenn.
Alabama By-Products Corp., Maxine mine, Maxine, Jefferson Co., Ala.
Lockhard Coal Sales, Shamokin, Pa.
Cain Coal Sales, Shamokin, Pa.
Armco Steel Corp., Nellis, W. Va.
Valley Camp Coal Co., #8 mine, Shrewsbury, W. Va.

**This is an exclusive COAL AGE monthly feature.*

Among the Manufacturers

Okonite Moves Top Officers

The Okonite Co., Passaic, N. J., in broadening the scope of management functions, has named Albert F. Metz to the newly created post of chairman of the board and chief executive officer, R. Stuart Keefer, president, and Edward D. Youmans, vice president in charge of research and product development. The new management setup has been brought about by a sharp growth in volume of business, accompanied by vastly more complex operations and increased emphasis on research and product development, the company reports. Messrs. Metz, Keefer and Youmans were respectively president, vice president in charge of sales, and vice president in charge of manufacturing and research. Charles M. Kirkland, factory sales manager at the Passaic plant, has been named vice president in charge of sales, and David W. Nurse, resident manager of the Wilkes-Barre plant, has been elected vice president in charge of manufacturing for the company's three factories.

McNally Pittsburg Allied With Canadian Firm

McNally Pittsburg Mfg. Corp., Pittsburg, Kan., has formed an engineering and manufacturing alliance with the Riverside Iron & Engineering Works, Ltd., Calgary, Alberta, Can. All McNally-Pittsburg engineering services, patents and drawings will be placed at the disposal of Riverside Iron, permitting Canadian coal operators to purchase coal-preparation equipment direct from the manufacturer, the Riverside Iron & Engineering Works, with the benefit of McNally Pittsburg's experience.

MSA Names Engineering Head

Mine Safety Appliances Co., Pittsburgh, has appointed Charles W. Punton as director of engineering. With the company since 1929 when he joined MSA as an industrial engineer, Mr. Punton has served as works manager since 1941.

Newton Joins WEMCO

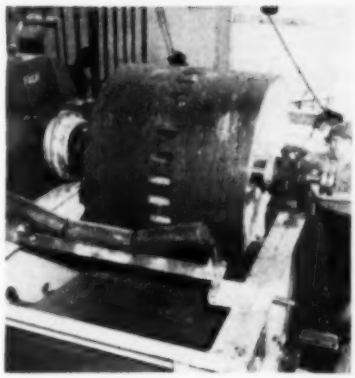
Western Machinery Co., San Francisco, has appointed William H. Newton general sales manager of the Wemco Div. For the past 20 yr, Mr. Newton has been associated with the Jeffrey Mfg. Co., Columbus, Ohio, in design, research, sales management and department management. Richard T. Lassiter has been appointed manager of the New York office of the Western-Knapp Engineering Div. of Western Machinery. Prior to his transfer to this post, Mr. Lassiter was chief engineer for Western-Knapp Engineering on the White Pine Copper Co. project near Berglund, Mich.

Allis-Chalmers Advances Pohl

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has promoted Neil Pohl to the newly created position of motor grader sales manager, industrial sales department, Tractor Div. He had been industrial sales manager at the Kansas City branch of the Tractor Div. since May, 1952, and had held the same position at the Winnipeg, Man., Canada, branch prior to that.

Caterpillar Marks 50th Year of Track-Type Tractors

MEDALLION representing the theme for a commemorative program Caterpillar Tractor Co. will conduct in 1954 to mark the 50th anniversary of the world's first practical track-type tractor is unveiled by Louis B. Neumiller (left), company president, and H. S. Eberhard, executive vice president. The Holt Mfg. Co., one of Caterpillar's parent companies, successfully tested the first practical crawler on Nov. 24, 1904, in Stockton, Calif., and about that time also originated the trademark, "Caterpillar." The first Holt unit was the forefather of some 340,000 track-type tractors of all makes now working in various fields, exclusive of military, in the U. S. alone, the company reports.



King-Sized Magnetic Pulley

BUILDING of what it believes to be the largest electro-magnetic pulley in the world has been reported by Stearns Magnetic Pulley Co., Milwaukee, Wis. The unit, 60 in in diameter and with a 48-in face, is installed in the Oak Creek power station operated by the Wisconsin Electric Power Co. to prevent damage to expensive crushers and other equipment by removing all tramp iron from the coal used at Oak Creek. In addition to its size, the pulley pioneers with the use of new-type lagging that provides three times the traction of rubber lagging without belt wear and permits maximum use of the pulley's magnetic strength, Stearns Magnetic reports.

ESB Promotes Three

The Electric Storage Battery Co., Philadelphia, has announced three promotions in its recently formed industrial products division. C. J. Moore, former manager of railway and motive power sales, has been made industrial products sales manager. W. E. Nyce has been appointed manufacturing manager, and L. E. Wells, former chief engineer, has been made director of research and engineering. The three new appointees bring to their positions experience in the storage battery industry totaling almost 100 yr.

SWECO Consulting Engineer

Southwestern Engineering Co., Los Angeles, has appointed Tom Lyon, until recently director of the Domestic Expansion Div., Defense Materials Procurement Agency, a consulting engineer. Mr. Lyon, affiliated for more than 20 yr with International Smelting & Refining Co., a subsidiary of Anaconda Copper Mining Co., was assistant to the general manager of the company on his retirement in 1950.

Esgate Thew Vice President

E. E. Esgate has been elected a vice president of the Thew Shovel Co., Lorain, Ohio. Joining Thew in May, 1949, as assistant to the general manager, he has been active in all phases of the company's operations since that time. Previously Mr. Esgate was active in the development of equipment and methods for

(Continued on p 170)

Association Activities

Harlan Operators Meet

At the annual meeting of the Harlan County Coal Operators' Association, held Nov. 18, at Harlan, Ky., J. E. Taylor, general manager, High Splint Coal Co., High Splint, Ky., was elected president; F. L. Dupree, president, Clover Darby Coal Co., Harlan, Ky., vice president; and George S. Ward, secretary. Elected to the executive board were: Pearl Bassham, Harlan Wallins Coal Corp.; Harry M. Bennett, Dartmont Coal Co.; Kenes Bowling, Bardo Coal Mining Co.; S. J. Dickenson, Mary Helen Coal Corp.; J. S. Greene, Garmeada Coal Co.; Charles S. Guthrie, Harlan Fuel Co.; L. P. Johnson, Crummies Creek Coal Co.; John Mayhew, Blue Diamond Coal Co.; D. A. Perkins, Perkins Harlan Coal Co.; R. C. Scott, Cornett-Lewis Coal Co.; A. F. Whitfield Jr., Clover Fork Coal Co.; and B. W. Whitfield III, Harlan Collieries Co.

AIME Elects M. D. Cooper

Maurice D. Cooper, director of mining engineering education, National Coal Association, has been elected head of the Coal Div., American Institute of Mining and Metallurgical Engineers.

Southern Appalachian Group Reelects Griffith President

At the annual meeting of the Southern Appalachian Coal Operators' Association, Nov. 20, at Knoxville, Tenn., Charles R. Griffith, president, Southern Coal & Coke Co., was re-elected president of the association. S. G. Moore was named first vice president, and L. C. Hammock, second vice president. H. S. Homan was re-elected executive secretary-treasurer. Directors named were: S. G. Moore, chairman; Gordon Bonnyman; H. D. Faust; C. R. Griffith; L. C. Hammock; W. C. Hutcheson; Fred Loving Jr.; D. A. Perkins; W. T. Ray; Jacob T. Reams; R. L. Sterns Jr.; C. J. Potter; and Warren Hayden, alternate.

North Cambria Institute Meets

At the 38th annual meeting of the Coal Mining Institute of North Cambria, Nov. 7, at Barnesboro, Pa., the following officers were elected for the coming year: Dennis Keenan, president; George Resick, vice president; Joseph Cole, secretary; William Todhunter, treasurer; J. Earl Lamont, assistant secretary; and Frank Shutty, assistant treasurer. Elected to the board of directors were: Pete Wilson, Dave Dreischer, Richard Todhunter Jr., Mike Mehall, Robert McCormick Sr., George Dunchuck, James Froggart, C. J. Sharbaugh, and Peter Tisack. The meeting, attended by 340 members, heard the following speakers: T. S. Spicer, Pennsylvania State College School of Mineral Industries, on "Coal Research as It Affects the Industry;" Paul Budzak, inspector, American Re-Insurance, Pittsburgh, "Man-Made Hazards and Workmen's Compensation;" J. A. Blackburn, Pennsylvania Department of Mines, "Protective Coating of Mine Roofs and Ribs to Prevent Deterioration;" and William Meakin, Joy Mfg. Co., "Modern Coal Mine Ventilation."

Ohio Reclamation Elects

At a meeting of the board of directors of the Ohio Reclamation Association, Oct. 29, Frank C. Morrow, president, Buckeye Furnace Mining Co., Wellston, Ohio, was elected president of the association, succeeding Miller Munjas, president for the past 2 yr. Richard James Jr. was named vice president, succeeding Mr. Morrow. James Robb, Larry Cook and Robert Kinnard were renamed to their posts as secretary-treasurer, executive vice president and executive secretary, respectively.

Anthracite Looks Ahead For Progress Week

Frank recognition of the problems facing the anthracite industry and evidences of concerted effort to solve these problems were major indicators of the industry's attitude throughout the celebration of Anthracite Progress Week in the anthracite-producing area, Nov. 16-21. Highlights of the celebration were addresses by Secretary of the Interior Douglas McKay to 700 industry and community representatives at Scranton, Nov. 18; Edward G. Fox, president, Philadelphia & Reading Coal & Iron Co., to the Pottsville Chamber of Commerce, Nov. 17; and Frank W. Earnest Jr., president, Anthracite Institute, to the Wilkes-Barre Rotary Club, Nov. 17. Major displays of modern automatic anthracite burners and a new vacuum ash-removal system were featured in prominent locations in the three cities.

Speaking at the Masonic Temple, Scranton, Secretary McKay praised the Scranton Plan, which stresses the regional advantages available and offered to new industries, as down-to-earth approach to the basic problem confronting these labor-surplus areas. The Scranton Plan is more effective than any "Washington plan" or "Harrisburg plan" in maintaining the economic independence of the region. Accelerated research to find new uses for anthracite, concentrated effort on reducing production costs and aggressive selling in the anthracite region and in the primary consuming areas also are vital, Secretary McKay pointed out.

On the subject of competitive fuels and their impact on anthracite, Secretary McKay explained that the government cannot be biased in favor of any one of the several sources of energy, and that the government must act only when and if local remedies fail.

At Pottsville, Mr. Fox came out for federal restrictions on the dumping of foreign residual oil and for reconstitution of anthracite's production-allocation plan. Increased research to find industrial markets for anthracite and mechanization studies to increase productivity must be carried on, Mr. Fox said.

Also noting the damaging effects of foreign oil on anthracite markets, Mr. Earnest pointed out in his Wilkes-Barre address that anthracite's biggest problem is survival through the close-up future. The only answer to lower production costs and selling prices is higher production per man-day, Mr. Earnest declared, in stressing the need for increased efficiency in operations and further mechanization.

Throughout the week, major companies held open house at a number of mines and preparation plants; school children were conducted on mine tours; industry representatives presented regional radio and television messages on the importance of the industry to the economic health of the communities in the area; and Miss Anthracite, Miss Lee Kozick, Dallas, Pa., visited New York, Philadelphia, Harrisburg and other eastern cities as a good-will messenger for anthracite and Anthracite Progress Week.

Preparation Facilities

W. P. Stahlman Co., Corsica, Pa.—Contract closed with the Jeffrey Mfg. Co. for screening facilities, handling 6 x 0 at 180 tph.

Cinderella Coal Co., Hatfield, Ky.—Contract closed with the Jeffrey Mfg. Co. for fine-coal drying facilities, handling ¼ x 0 at 50 tph.

D & Z Coal Co., Shamokin, Pa.—Installation by Menzies Separator Co. of one 6-ft Menzies Cone, cleaning stove and nut at feed capacity of 40 tph; and one 2-ft Menzies Cone, cleaning No. 1 buckwheat at feed capacity of 7 tph.

Reidinger Coal Co., Paxinos, Pa.—Installation by Menzies Separator Co. of one 2-ft Menzies Cone, cleaning pea coal at 7-tph feed capacity.

Di Renzo Coal Co., Minersville, Pa.—Installation by Menzies Separator Co. of two 2-ft Menzies Cones; one cleaning No. 1 buckwheat at 7 tph, and the other cleaning pea at 7 tph.

Penag Coal Co., Goodspring, Pa.—Installation by Menzies Separator Co. of one 4-ft Menzies Cone, cleaning No. 1 buckwheat at 22-tph feed capacity.

O'Brien Coal Co., Suedburg, Pa.—Installation by Menzies Separator Co. of one 2-ft Menzies Cone, cleaning barley at 7-tph feed capacity.

Moffat Coal Co., Taylor, Pa.—Installation by Menzies Separator Co. of one 8-ft Menzies Cone, cleaning pea coal at 70-tph feed capacity.

Alabama By-Products Corp., Maxine mine, Praco, Ala.—Shipment by Deister Concentrator Co. of 10 No. 7 SuperDuty Diagonal-Deck coal-washing tables handling ¼x0 coal, and two Concenco revolving feed distributors feeding the tables.

Pocahontas Fuel Co., Bishop Mine No. 33, Bishop, Va.—Shipment by Deister Concentrator Co. of three Model 108-B Concenco revolving feed distributors, each arranged for 8-way split of ¾x0 feed.

Altos Hornos De Mexico, S.A., Monclova, Coah, Mexico—Contract closed with Jeffrey Mfg. Co. for one 1-compartment diaphragm jig to be added to existing 2-compartment unit, to increase tonnage of 4x0 coal.

Wilmot Chain Will Replace the Same Size Number of Any Other Rivetless Chain

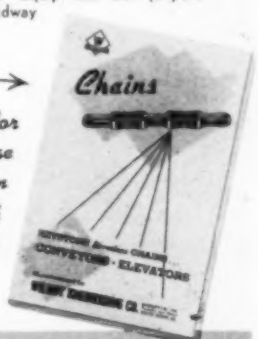
As the originators of rivetless chain, Wilmot offers the largest choice of sizes available. Any one of them will interchange with the same number of any other chain. In the Wilmot catalog you will also find by far the largest listing of attachments.

Chain furnished in pitches from 3" to 10½" and in working loads from 3,000 to 130,000 lbs., of drop-forged steel, alloy, or cast chrome-manganese. As the originators, Wilmot has been largely responsible for the many auxiliary parts that today give these conveyors almost limitless applications. Wilmot has everything for your conveyer, from drive to take-up. Because of its complete choice of parts, conveyor maintainers are increasingly depending on Wilmot for all replacements.

WILMOT REPRESENTATIVES

BIRMINGHAM 5, ALA. -- Amos A. Culp, 429 South 24th Street
CHARLESTON 23, W. VA. -- Cross Pump & Equipment Co., P. O. Box 889
DENVER, COL. -- Kendo Equipment Co., P. O. Box 4202, So. Denver Station
HONOLULU 6, H. I. -- P. S. Pell & Co., Ltd., 88 S. Queen St.
INDIANAPOLIS 20, IND. -- Paul W. Huddlestun, 5745 Guilford Ave.
KNOXVILLE, TENN. -- Crowell Engineering & Sales Co., 3045 Sutherland Ave.
PITTSBURG 16, PA. -- Harold C. Lusk, 3045 W. Liberty Ave.
PORTLAND 4, ORE. -- Peoria Chain Co., 103 S. W. Front Ave.
ST. LOUIS 5, MO. -- Jack Van Horn, 7543 Cromwell Drive
SALT LAKE CITY, UT. -- Western Sales Engineering Co., 375 S. W. Temple
NEW YORK 38, N. Y. -- International Manufacturing & Equipment Co. (export only), 220 Broadway

Send for 248-page Book on Chain & Conveyors



WILMOT ENGINEERING CO. HAZLETON, PA. *Plant:* WHITE HAVEN, PA.

Kentucky

Record attendance highlights discussion of varied present-day operating topics at 14th Annual Meeting of Kentucky Mining Institute.

ROOF PAINTING, underground gas storage, germanium and sulphur in coal, registration of engineers—Front row, C. S. Crouse (left), A. D. Sisk, E. K. Newman, E. F. Milem, C. H. Hodgson and R. L. Smith. Back row, Charles Herbert (left), R. M. Henderson, Jack A. Hardwick, Ernest M. Spokes, E. E. Quenon and O. S. Batten.

AUGER MINING, signaling for locomotive haulage, personnel problems, electrical accidents in Kentucky mines—Seated, F. F. Stewart (left), Robert Uhl, J. T. Parker and Trent Kemp. Standing, George Leatherman (left), J. J. Forsyth, Joseph E. Moody, Guy Darst and I. H. Buchanan.

CONTINUOUS MINING in eastern Kentucky, coal bumps, Kentucky mine fires and explosions—Seated, Richard Storey (left), Charles T. Holland, D. J. Jones and G. O. Tarleton. Standing, J. J. Berry (left), A. M. Ayres, S. J. Dickenson, Paul G. Hall and A. D. Sisk.

REGISTRATION of over 300 at the 14th Annual Meeting of the Kentucky Mining Institute, Phoenix Hotel, Lexington, Nov. 12-13, was the top attendance ever reported for a meeting of the institute. Papers presented during the 2-day session covered a wide range of subjects, including: roof painting, germanium, sulphur, registration of engineers, underground storage of gas, track signals, auger mining, personnel problems, electrocutions, and mine fires and explosions in Kentucky mines.

Retiring president E. K. Newman, general manager, Wisconsin Steel Nos. 1 and 2 mines, International Harvester Co., presided at the meeting. Session chairmen were: E. F. Milem, general superintendent, Eastern Coal Corp.; J. T. Parker, general superintendent, Wheelwright and Price mines, Inland Steel Co.; F. F. Stewart, superintendent, Blair Fork No. 4 mine, Jewell Ridge Coal Corp.; S. J. Dickenson, general manager, Mary Helen Coal Corp.; and G. O. Tarleton, president, Consolidation Coal Co. (Ky.), and newly elected president of the institute.

Speaking at the luncheon, Joseph E. Moody, president, Southern Coal Producers' Association, leafed through and commented on the report just released by the Harvard School of Business Administration, "Coal Industry, Its Problems and Prospects." Troy Back, executive secretary, Federal Coal Mine Safety Board of Review, explained the board's duties and procedure. During the dinner, awards were presented to the National Mine Rescue Champions from Wisconsin Steel No. 2 mine of the International Harvester Co., Benham (*Coal Age*, November, p 138), and to the Kentucky state first-aid champions from the Crescent Coal Co., Central City. W. B. Sturgill, secretary, Hazard Coal Operators' Association, presided at the luncheon, and B. F. Reed, secretary-treasurer, Turner Elkhorn Mining Co., served as master of ceremonies at the annual dinner.

Reporting for the book committee, J. H. Mosgrove, secretary, Big Sandy-

INDUSTRY MEETING—
A Special COAL AGE
Staff-Written Report

Mining Problems and Progress

Elkhorn Mining Institute, Pikeville, said that 1,000 copies of "Elements of Practical Coal Mining" have been sold and an equal number of copies are available. The price is $4.50 for single copies, and $4 in lots of 12 or more. Remittance should be made to the "Mayo-KMI Mining Book Fund" and orders addressed to Mr. Mosgrove.

SUCCESSFUL ROOF COATING

Apparent success with a roof-coating compound consisting of an asphalt mixture containing a high-flash-point thinner and asbestos fiber was described in a paper, "Roof Coating to Prevent Detrimental Effect of Mine Atmosphere on Mine Roofs During Summer Months," by C. A. Herbert, mining engineer, USBM, Vincennes, Ind. The paper was read by E. E. Quenon, chief, Mt. Hope, W. Va., branch, USBM. Mr. Herbert presented the same paper at the National Safety Council meeting, Chicago, Oct 19-23 (briefed in *Coal Age*, December, p 167).

In discussion of the paper it was brought out that the compound used by the Bell & Zoller Coal & Mining Co. is "Mine Seal," made by Emulsion, Inc., Lawrenceville, Ill., and the pump is a "Sphinx," purchased through the Petit Supply Co., Paducah, Ky. Ignition temperature of the compound on the roof is 900 F and it is not as easily ignited as the coal. A torch will burn out a patch but the flame will not propagate of its own accord.

In response to a question, Mr. Herbert said that since the compound is only about 1/16 in thick on the roof, he thinks vibration of loose rock could still be detected when sounding roof, but that the sound would be deadened to a considerable extent.

GERMANIUM IN COAL

Germanium from coal warrants "only watchful waiting," according to a paper presented by Ernest M. Spokes, associate professor, Department of Mining & Metallurgical Engineering, University of Kentucky. In summarizing he said: "I do not think the individual coal producer would be justified in spending any money for research and development in germanium at this time. On the other hand, much can and should be done by governmental agencies, research laboratories and some few manufacturers in preparation for conditions which might make the germanium in American coals of commercial value."

RECOVERING SULPHUR FROM COAL

Sulphur from coal is not attractive at present, according to a thesis paper presented by Jack A. Hardwick, graduate student, University of Kentucky. He mentioned that in the past 2 or 3 yr a company doing some experimenting had found it uneconomical to recover $27-to $28-per-ton sulphur from a coal-mine refuse pile running 15% pyrite by weight. With sulphur at $35 per ton, however, recovery could be profitable. Describing the forms in which it is found, Mr. Hardwick pointed out that sulphur in coal constitutes the only large source left and that it behooves this country to make an examination of its sulphur supply.

C. S. Crouse, head, Department of Mining and Metallurgical Engineering, University of Kentucky, and secretary of the State Board for Registration of Engineers, presented a paper outlining the history of registration, the reasons why engineers should register, the requirements and procedure.

New Officers Kentucky Mining Institute

President—G. O. Tarleton, president, Consolidation Coal Co. (Ky), Jenkins, Ky.

Vice Presidents—S. A. Fox, general manager Southern mines, Blue Diamond Coal Co., Middlesboro; H. E. Knight, chief engineer, Bell & Zoller Coal & Mining Co., Madisonville; and F. F. Stewart, superintendent, Blair Fork No. 4 mine, Jewell Ridge Coal Corp., Tilford.

Secretary-Treasurer—A. D. Sisk, chief, Department of Mines and Minerals, Lexington.

Directors—Frank Smith, Blue Diamond Coal Co.; V. D. Picklesimer, South-East Coal Co.; R. L. Nichols, Black Star Coal Corp.; G. M. Patterson, West Kentucky Coal Co.; J. T. Parker, Inland Steel Co.; S. J. Dickenson, Mary Helen Coal Corp.; Douglas F. Crickmer, Pond Creek Colliery, N. & W. Ry.; C. J. Barton, Kentucky Ridge Coal Co.; E. P. Kerr, Eastern Coal Corp.; L. A. Hopper, Columbus Mining Co.; and E. K. Newman, Wisconsin Steel mines, International Harvester Co.

MINING NEAR GAS-STORAGE POOLS

"Acute" is the way Ray M. Henderson, assistant to the chief engineer, Consolidation Coal Co. (W. Va.), Fairmont, described the situation in his paper, "The Latest Problem to Coal Mining—Recovery in Proximity to Underground Gas Storage Pools." He cited two gas explosions in northern West Virginia mines as a result of the migration of gas through the coal seam, both of which occurred within 8 mi of where an underground gas storage pool now is located.

"Killed by explosion of natural gas which exuded from a gas well located near the mine," reads a 1911 report to the West Virginia Department of Mines, referring to one of those explosions. In this mine, that of the Consolidation Coal Co., gas blowers were found coming up through the pavement as far as 2,250 ft from the well. "The blowers came along a straight line which was parallel to the strike of the coal seam. The gas well was found to be closed in and after it was opened up the blowers began to recede."

In 1915, after a mine foreman was killed in York mine of the Hutchinson Coal Co., 4 mi from Clarksburg, W. Va., the coroner's jury determined that his open light had ignited natural gas which entered the mine from a gas well or wells in the immediate vicinity of the mine.

Uncharted wells and improperly plugged wells are the big hazard in northern West Virginia. Mentioning a statement of a gas-company representative that there is no danger to a coal mine overlying a gas pool if the mine is properly supervised, Mr. Henderson commented: "We hope this is true. But how can we assure ourselves that there is not going to be any migration from the storage pools into the coal mines?" He urged interested parties to get together and not wait until there is a disaster.

O. S. Batten, consulting engineer, Pikeville, Ky., stated that he is now working on a bill to be presented to the next legislature. He thinks that gas can be stored under coal with safety and that adequate laws are needed to enforce that safety. Some day the coal industry may want to make gas from coal and store it below the coal seams. Gas should not be stored in strata in which gas was not originally found, and where stored in gas-bearing strata the pressure should not exceed the original, he said. Legislation also should control the mixing of salt and fresh waters, which is taking place in some counties in Kentucky, Mr. Batten pointed out.

M. H. Forester, vice president, Pittsburgh Consolidation Coal Co., emphasized that the coal industry should convince the gas industry, that "we do have a problem and there is danger." The gas people must be convinced that the coal industry's interest is entirely one of safety, in spite of the fact that gas has taken away a lot of coal's business and will take more. Since we cannot depend on the USBM or the state departments, because they do not have the authority, there is need for legislation of a reasonable nature, Mr. Forester maintained.

Speaking for the USBM on the underground gas-storage problem, James Westfield, chief, Health & Accident Div., said that the Bureau is interested in the lives of men working underground and will take any steps necessary to protect them. Van Walker, also of the Bureau, said that it must take a neutral position in the economics of the subject. From the standpoint of the coal mine inspection act, the Bureau has a responsibility when hazards become imminent. The Bureau does not have sufficient information on wells, coal seams and seepage from underground storage to warrant action. It is interested in drilling, plugging, etc., and also in proposed legislation covering

Reduce PIPING INSTALLATION and MAINTENANCE COSTS

with PLASTEX *Yellow* PIPE

SAVE TIME because **PLASTEX** Yellow Pipe is lightweight . . . flexible . . . easy to handle. A 400 ft. coil can be carried by one man and connections made in a minute without special tools.

SAVE MONEY because **PLASTEX** Yellow Pipe is guaranteed against rust, rot and corrosion. It operates efficiently on drainage, fresh water, vent lines or electrical conduit without damage from corrosive elements.

Only **PLASTEX** Pipe has the exclusive yellow color that's easy to see and trace . . . handy 10 foot Measure Marks for quick, accurate installation. Mail coupon for complete specifications and prices.

Measure Marked every 10 ft. for faster, easier installation

PLASTEX SINCE 1939
PIPE & EXTRUSION CO.
402 Mt. Vernon Ave., Columbus, Ohio

PLASTEX PIPE & EXTRUSION CO.
402 Mt. Vernon Ave., Columbus 3, Ohio

Gentlemen:

Please send full information on how PLASTEX Yellow Pipe can save money on mine piping jobs.

Name .....

Firm .....

Address .....

City ..... State .....

Use PLASTEX PIPE and See the Difference

storage of gas below coal measures. However, it is necessary, to preserve the Bureau's policy, to go very thoroughly into a subject before advocating specific legislation, he pointed out.

Noah Howard, general manager, Elkhorn Coal Corp., outlined many difficulties coal mining encounters from oil and gas wells through the seams. Many wells have no casings left in them to protect the coal and many are not properly plugged. How are the gas companies going to determine if strata displacement from mining has damaged a casing? he asked. Speaking for Kentucky, he said that bills should be introduced in the February, 1954, legislature to provide proper regulation of oil and gas wells.

Forest L. Apple, resident engineer, Ford Motor Co., Stone, Ky., maintained that research is needed to find the best way to plug a well and to determine how much gas can be put back in storage in relation to the discovery pressure. It should be the duty of the Kentucky Department of Mines and Minerals to set up minimum standards and see that they are followed, and it should be the responsibility of the gas company to properly drill, case and plug to conserve water, gas and coal, he believes. Accurate records should be kept of well location, date of completion, proper plugging and installation of monuments over abandoned wells.

A. D. Sisk, chief of the Kentucky Department of Mines and Minerals, said that the plugging laws are completely out of date and new laws are needed without delay. His department "has been shouting danger from the roof tops for nearly 6 yr," Mr. Sisk stated. He is not concerned about the seven storage pools now in Kentucky, but is afraid of the future.

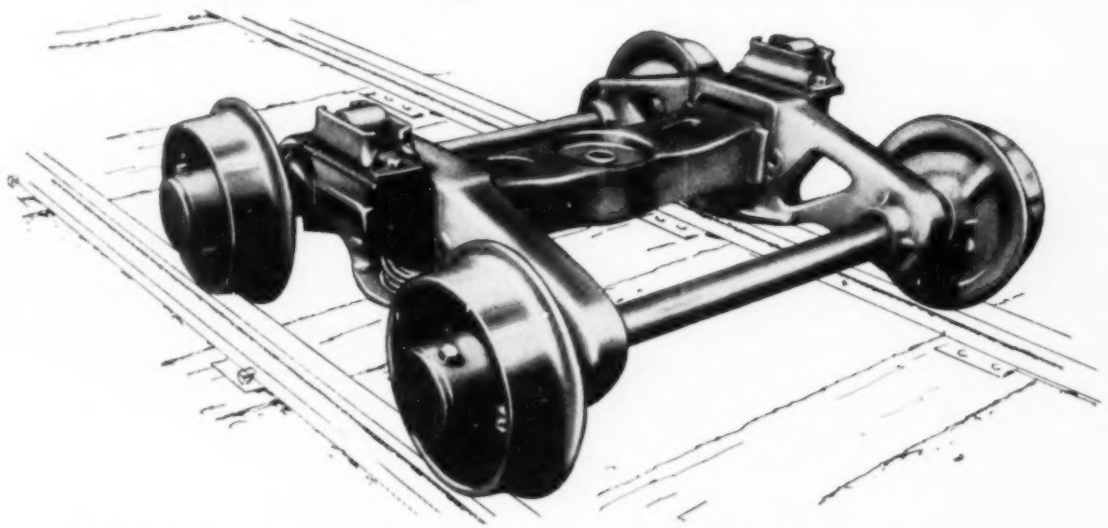
MAIN HAULAGE SIGNALING

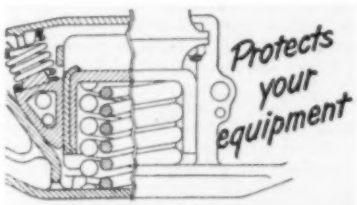
Signals and automatic track switching for a 5-mi single-track underground haulway to the Price preparation plant of the Inland Steel Co., Price, Ky., were described by G. F. Leatherman, superintendent, Inland Steel, power and mechanical department. He explained that his paper brought up to date his presentation on the same subject at the American Mining Congress meeting in Cincinnati, April, 1950 (*Coal Age*, June 1950, p 180).

Experience has shown it pays to have a maintenance man travel the entire 5-mi haulway before each day shift, Mr. Leatherman reported. This inspection, replacing lamps, making minor repairs and adjustments, requires about 2 hr a day. It was found desirable in some cases to change the spacing of trolley contactors from the original. Face-heading entrances to the main haulway were changed from automatic to manual with push buttons installed at the telephone from which the dispatcher is called to be told what equipment is coming onto the mainline. An electric track switch was installed with automatic control by trolley contactors to shunt runaway empty cars into an unused entry.

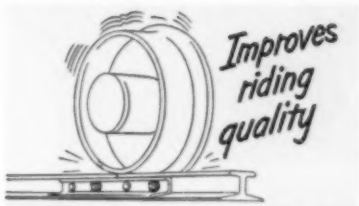
"Experience with signal systems has proven beyond a doubt their value to

Specify NATIONAL NC-1 trucks for your large 8-wheel mine cars

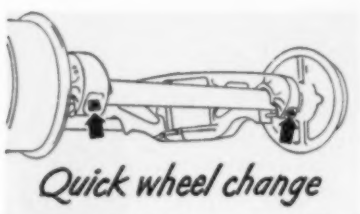




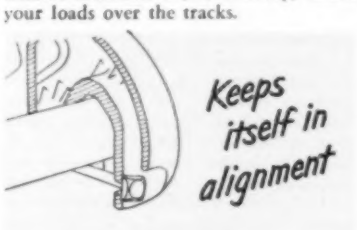
Shock-absorbing system of the NC-1 truck is similar to designs of the American Association of Railroads for full-size freight car trucks. The oscillation control mechanism (see cutaway) floats your loads over the tracks.



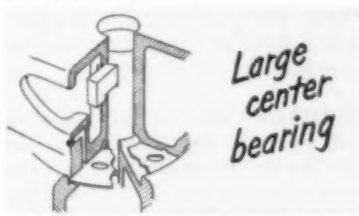
Track irregularities are no hindrance to higher speeds for mine cars when they are equipped with National NC-1 trucks. Truck design and large diameter, low stressed, load-carrying springs improve riding qualities.



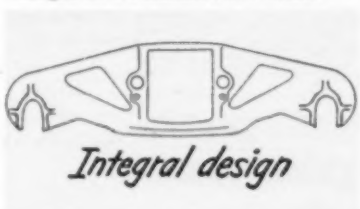
Removal of bolt at each end of side frame permits quick wheel and axle assembly change. Cuts repair time and costs . . . keeps cars in operation longer. No lengthy tie-ups for wheel and axle changes on a National NC-1 truck.



The NC-1 truck stays square automatically. V-shaped slots over the axles make it impossible for the truck to get out of square without lifting entire weight of the car body and lading—means longer service, less repairs.



National NC-1 truck's large center bearing provides maximum wear life by reducing per-square-inch loading... provides bolster stability. Has easily replaceable centerplate shims and adequate provision for lubrication.



Side frame and bolster are each of one-piece, integrally cast construction similar to the National C-1 trucks used on railroads. Gives maximum strength, minimum weight—has *no welds or rivets to shake loose.* A-3030

For minimum maintenance time and spillage, plus maximum equipment protection—specify National NC-1 trucks on your next 8-wheel mine car order.

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Cleveland 6, Ohio

Willison Automatic Couplers • Friction & Rubber Draft Gears • Car Trucks • NACO Steel Wheels • NACO Steel Links & Swivel Hitchings

NATIONAL Products FOR TRANSPORTATION AND INDUSTRY Est. 1868

Old Jack Frost doesn't stand a chance against coal that's de-watered with Bee-Zee Round Rod Screens. These long-life, extra-efficient screens are unmatched for lowering moisture content. That means you avoid the expense and delay that results when your coal freezes in the cars. It's just another of the many ways Bee-Zee Screens make you money!

BEE-ZEE EXTRAS — Besides their unequalled efficiency in de-watering, Bee-Zee Screens guarantee extra months of accurate screening . . . less down-time. They can be fitted to any coal processing equipment.

WRITE FOR CATALOG

BIXBY-ZIMMER
Engineering Co.
114 Abingdon St. Galesburg, Illinois

safe and efficient track haulage systems," Mr. Leatherman concluded. "However, it is not proposed here to operate such haulage on signal systems alone. Trolleyphones installed on locomotives and in the dispatcher's office, as well as the old faithful magneto telephone system, have proven important adjuncts for long-distance track haulage."

AUGERING IN WEST KENTUCKY

Production from a Model 56 Compton coal auger has averaged 334 tons per 7½-hr shift in their No. 12 coal, said R. H. Uhl, engineer, W. G. Duncan Coal Co., in a paper, "Augering Coal in Western Kentucky." He said that with an operating crew of four men, including a tractor operator but not haulage or pit preparation, production of 80 tons per man can be realized. Approximately 45% was 1-in or larger lump. The deeper the hole, the finer the coal. To permit passage of haulage units between the machine and the spoil bank, the pit should be 75 ft or more for the Model 56 machine.

The W. G. Duncan company purchased the Compton auger in July, 1952, and put it into use the next month with a 44-in cutter head, taking both the No. 11 and No. 12 seams along a 2,000-ft exposed wall where the coal width was 100 to 200 ft to the face line of a worked-out underground mine. As the No. 11 coal (65 in thick) was drilled, the pit was backfilled to a depth of about 10 ft and then the No. 12 seam (56 in thick) was drilled.

Since then, the auger has been used in three other pits and coal recovered up to 211 ft. After an auger was caught by subsidence in an area over worked-out No. 11 coal and had to be dug out, it was decided to do no further drilling in the No. 12 seam over old works.

In summary, Mr. Uhl said, "The coal auger will recover as much as 60% of the seam to a depth of 211 ft in areas that would otherwise be abandoned because of excessive overburden or irregular strip lines along borders of worked-out underground mines. An experienced operator is necessary to keep the auger lined up with the coal seam and even then the roll of the seam will prevent some of the holes from being drilled to maximum depth." He characterized the coal auger as "one method of achieving more tonnage with less manpower, one means of producing coal at a lower cost, one more machine with which to mechanize our mines."

EASTERN-KENTUCKY AUGERING

Although auger mining, according to Guy B. Darst, Benedict Coal Corp., is "another mechanical method of raising production per employee and compares favorably with highly productive mechanical deep mining . . . it is no picnic in the mountains of eastern Kentucky." In his paper, "Contour Auger Mining in Eastern Kentucky," he described his company's work with a Model 56 Compton auger in the 5-ft No. 10 seam lying at 3,100- to 3,200-ft elevation in Harlan County, Kentucky, and Lee County, Virginia.

Because of slate partings, very bad

NEW COALMASTER ROOFBOLTER Augers · Drill Rods

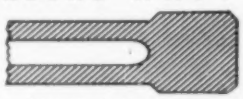
STANDARD SHANK for
- Baker-Fletcher
- Chicago-Pneumatic
- Jeffrey, Joy and other Shanks furnished in welded construction

STANDARD SOCKET for any make bit, as
- Kennametal
- Sulmet
- Firthite
- Carboloy

ANY LENGTH from 12" to 84"
(longer on request)

...and here are 3 reasons WHY!

1. **ONE-PIECE, NON-WELD CONSTRUCTION.** Shanks and sockets are both an integral part of every Coalmaster Auger or Drill Rod—fashioned right from the same piece of steel (not welded as in other competitive makes). The result: the most rugged durability possible, for either wet or dry drilling, with minimum loss due to breakage.


SHANK FOR B. F. DRILL

SHANK FOR C. P. DRILL

2. **HEAVY-DUTY TUBING.** Husky-walled seamless steel tubing throughout . . . a high-tensile alloy, heat treated for maximum performance.

3. **SPIR-L-WELD FLIGHT.** An exclusive Coalmaster feature . . . smooth, non-clog design for producing a clean, accurate hole—without drag or jam. Sharply speeds up production time, cuts operating costs, at each hole.

Distributed by:

AUSTIN POWDER CO.
Cleveland, Ohio

AUSTIN POWDER CO.
Evansville, Ind.

DOOLEY BROTHERS
Peoria, Ill.

FAIRMONT SUPPLY CO.
Fairmont, W. Va.

FAIRMONT SUPPLY CO.
Washington, Pa.

ILLINOIS POWDER MFG. CO.
St. Louis

ILLINOIS POWDER MFG. CO.
Salt Lake City

JOY MFG. CO.
Main Office, Pittsburgh, Pa.
Representatives throughout world.

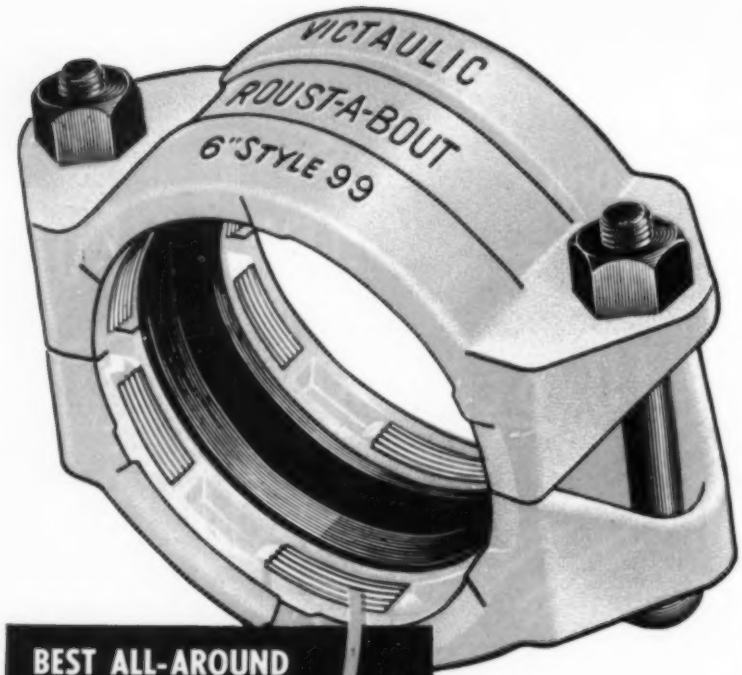
SALEM TOOL CO.
Salem, Ohio

E & E MINE SERVICE
Christopher, Illinois

DRILLING COALMASTER TOOLS

CENTRAL MINE EQUIPMENT COMPANY

ST. LOUIS 15, MO.



BEST ALL-AROUND PLAIN END PIPE COUPLING ON THE MARKET!

HERE'S WHY... *The Roust-A-Bout grips (teeth) take a strong, positive, circumferential bite on the pipe—as does a Tubing or Pipe Slip. The curved grips assure maximum gripping area for greatest holding power. This is the exclusive Roust-A-Bout, bull dog grip.*

Why accept less than the best when you are using plain end pipe couplings? Victaulic Roust-A-Bouts are specially engineered to provide the most reliable pipe connections you can use. With inclined, curved grips they bite into pipe circumference—provide a far stronger and surer hold.

Roust-A-Bout Couplings are just what the name implies—reliable, sturdy, adaptable and ingenious—ready for those tough field jobs where only plain end pipe is used or where the simple Victaulic Groove Method is not quickly available.

Victaulic Roust-A-Bouts are quick and easy to install:...

- You *cut* and *couple* your pipe as you go!
- You can use *plain* or *beveled end* pipe!
- You can use *new* or *used* pipe!
- For use on *permanent* piping or *repair* work!
- You need only one tool—a *socket wrench!*
- Roust-A-Bouts are simple and factory finished!

For your next job—insist on the best—Victaulic Roust-A-Bouts. They're available at all Victaulic Stocking Supply Houses in pipe sizes—2", 2½", 3", 3½", 4", 5", 6", and 8".

Write today for the Victaulic Roust-A-Bout Catalog No. 44-BA.

VICTAULIC COMPANY OF AMERICA • **P. O. BOX 509 • ELIZABETH, N. J.**

Office and Plant: 1100 Morris Ave., Union, N.J. • Telephone Elizabeth 4-2141
West Coast: Victaulic Inc., 2330 East 8th St., Los Angeles 21
Canada: Victaulic Co. of Canada Ltd., 406 Hopewell Ave., Toronto 10
Export: Pipe Couplings, Inc., 30 Rockefeller Plaza, N. Y. 20, N. Y.

top and soft bottom, strip and auger mining around the 16-mi outcrop is the only method by which any value can be realized from this seam of coal. With the steep slope and hard slate top it is difficult, but not impractical, to strip to provide the 70-ft width necessary for the machine. Seam undulations causing the auger to get into top and bottom "makes a cleaning plant almost mandatory." At Benedict the ¾-inx0 is air-cleaned. With the adequate preparation plant already on hand, investment in roads, bins, etc., was about $45,000. Mr. Darst said that total investment to open a strip-auger operation for their set of conditions will be $350,000 to $400,000, including auger, 2½-yd shovel, bulldozers, highwall drills, compressors, trucks, etc.

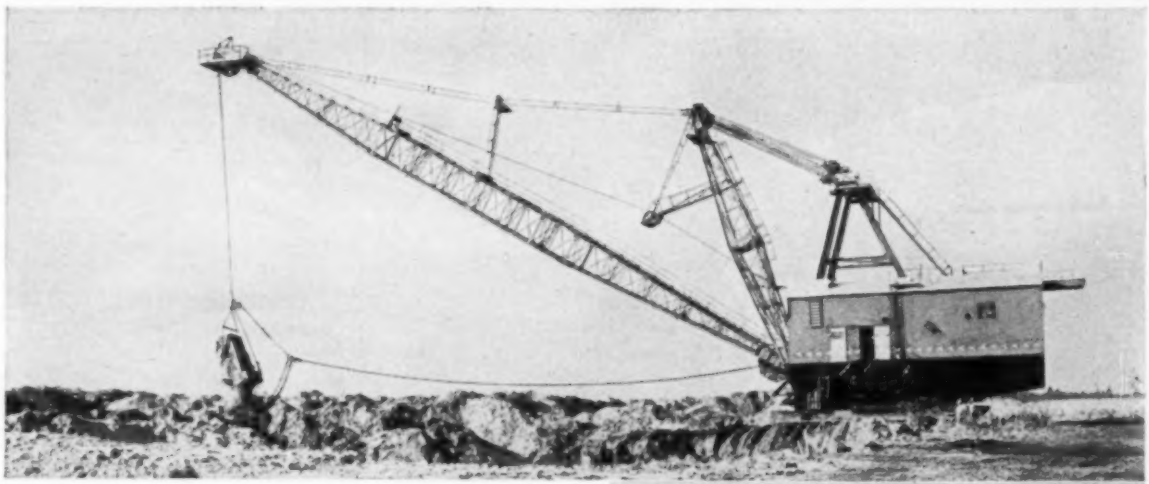
Describing their contour strip mining in Magoffin and Breathitt counties, Kentucky, where only one cut can be taken, and their experience there with a Compton Model 36 auger since August, 1953, I. H. Buchanan Jr., Buchanan Coal Co., said that if strip operations are conducted with auger mining in view the preparation for the auger then can be reduced. Their machine is 36 ft long and they are using a 36-in cutter head. Although they have eight 20-ft sections and have drilled to 160 ft, they find that drilling to a depth of 100 ft is best for their conditions.

Cutter-head diameter should be 10 to 12 in less than seam thickness. Four-inch-plus coal constitutes about 20% of the total brought out by the auger. Although a bony structure near the center of the seam raises ash percentage above the channel sample, when auger coal is properly blended with strip coal, the auger can add to the quality and has a definite place in contour recovery, Mr. Buchanan stated.

John K. Berry, production engineer, Clinchfield Coal Corp., referring to use of a 48-in Compton auger, said that it is truly a supplement to strip mining because the highwall cannot keep ahead of it. If for this reason an auger must be idle part of the time, a smaller machine which will have less depreciation cost might be the answer, he suggested. In reply to a question as to the practicability of augers in underground mining, Mr. Berry mentioned experience in a 32-in seam (*Coal Age*, September 1951, p 74) and said that a satisfactory method of elevating and transporting the coal from the underground auger has not been developed. With that perfected, coal can be cheaply mined underground with an auger. Mine development for auger-mining block or pillar recovery will be done with some other type of equipment, rather than with the auger.

In northern West Virginia, where the higher impurities are at the top and bottom of the seam, auger mining produces coal of better quality, said Donald M. Bondurant, sales manager, Compton, Inc. If by misalignment the auger cuts into top or bottom, such segments are small compared to the volume of the cut. With the smaller-type machine, an investment of $100,000 will set up a company in the auger-mining business,

Turn Half of Your Dragline Replacement Costs into Profits



Many Have By Switching TO Tuffy® DRAGLINE

Twice The Service means half the cost—and that's exactly the kind of service Tuffy is now giving to many mine operators! By cutting dragline replacement costs 50%, you get *extra* profits that you're now losing. Figure out how much that could mean to you in actual dollars and cents!

Big, Modern Equipment—like the giant walking draglines and high capacity drag buckets—is designed for more efficient stripping. But you have to *keep* those big boys on the job to get the most out of your investment! Tuffy Dragline has the extra stamina, flexibility and abrasive resistance the big ones need . . . helps you move more material up to twice as long!

Try Tuffy Dragline on your own drags. Compare the service you get from Tuffy to the service you're now getting . . . and see how much more cents-a-ton profit you may make with Tuffy Dragline!

Tuffy Scraper Rope Flexible enough to withstand sharp bends . . . stiff enough to resist looping and kinking when slack . . . tough enough to stand off drum crushing longer!

Tuffy Dozer Rope Designed to take the punishment of small winch drums and small sheaves . . . the shock of blade manipulation under toughest going!

Tuffy Slings 9-part, machine braided wire fabric construction is extra flexible, extra strong . . . resists looping and kinking, fights off damage!

Tuffy Slusher Rope Rigid, non-collapsing to eliminate drum crushing . . . elastic and flexible to take shock loads!

union Wire Rope **corporation**

2130 Manchester Avenue Kansas City 26, Mo.

Specialists In High Carbon Wire, Wire Rope and Braided Wire Fabric

MINE CAR WHEELS *Lubricated for Almost 2 Years*

without changing or adding grease!

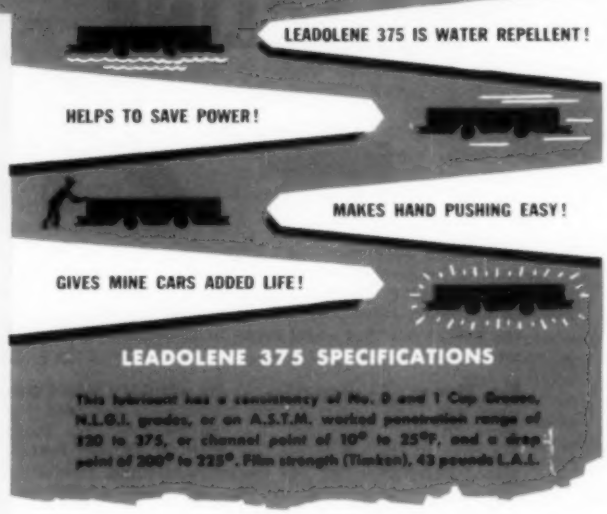
with BROOKS

LEADOLENE 375

A large mine in Western Pennsylvania tested *Leadolene 375* in the roller-bearing wheels of an 8 ton capacity steel mine car. At two month intervals, a wheel was removed and inspected. At the end of *22 months* a few ounces of the lubricant remained in the housing and the roller bearings were in perfect condition. No grease was added!

This test was made under actual mine operating conditions—with the car being subjected to regular coal mine loading and transportation practice. It is an outstanding achievement for Leadolene 375, since it has been customary to grease mine car wheels every six months, with other lubricants.

Investigate the savings made possible with Leadolene 375 in lubricating roller bearings in *your* mine car wheels. Write our nearest sales office today!



LEADOLENE 375 SPECIFICATIONS

This lubricant has a consistency of No. 0 and 1 Cup Greases, N.L.G.I. grades, or an A.S.T.M. worked penetration range of 120 to 375, or channel point of 10° to 25°F, and a drop point of 200° to 225°. Film strength (Timken), 43 pounds L.A.L.

The Brooks Oil Co.

Better Industrial Lubricants Through Constant Research

SINCE 1876

DISTRICT SALES OFFICES: CLEVELAND, OHIO
PITTSBURGH, PA. • GIRARD, OHIO • DETROIT, MICHIGAN
CHICAGO, ILLINOIS • BIRMINGHAM, ALABAMA • STEUBENVILLE, OHIO
HAMILTON, ONTARIO • TORONTO, ONTARIO • OUTREMONT
(MONTREAL DISTRICT) QUEBEC • SANTIAGO DE CUBA

Executive Offices and Plant.....CLEVELAND, OHIO
Executive Sales Offices.....PITTSBURGH, PA.
Canadian Offices and Plant.....HAMILTON, ONTARIO
Cuban Office.....SANTIAGO DE CUBA

providing certain functions such as haulage are contracted, Mr. Bondurant reported. Answering a question relative to bit cost if pyrite is encountered, he said that if the pyritic material is lenticular the bit cost may be 5c per ton, but if spherical it may go to 25c per ton.

IMPROVING MINE SUPERVISION

Personal leadership is the most difficult quality to get in a supervisor, said Trent Kemp, Jewell Ridge Coal Corp., speaking on "Personnel Problems." A supervisor is confronted with the two-edged problem of getting production and according the men treatment in keeping with "human decency." The supervisor must have know-how, a clear understanding of his responsibility and a skill for instructing. The supervisor should try to get the workman's point of view, tell him how he is getting along on the job, give reasons in advance for changes to be made and, in case of dissatisfaction, deal with it early before it becomes magnified, Mr. Kemp pointed out.

FATALITIES FROM ELECTRICITY

The shock hazard of live framework or mobile face equipment is much less than some contend and a third, or ground, wire is not justified, said Frank J. Forsyth, electrical inspector, Kentucky Department of Mines and Minerals, in a paper on "Electrocutions in Kentucky Coal Mines." During the 19 yr Kentucky has kept records of causes of accidents, there have been 122 electrocutions, with only two of them resulting from live cutting-machine frames and mobile face equipment.

The trend in number of electrocutions is definitely down and if the trend continues at the present rate there will be very few or no electrocutions by 1970, Mr. Forsyth stated. Generally speaking, the number of electrocutions has varied with the number of men employed, although the greater use of insulated conductors has lessened the hazard. Of the total of 13 electrocutions since 1949, eight were caused by contacting trolley wires.

COAL BUMPS—CAUSE AND REMEDY

"Coal Bumps" was the title of a paper presented by Charles T. Holland, professor and director, Mining Engineering, Virginia Poytechnic Institute, Blacksburg. After describing the conditions present where many bumps have occurred—always in heavy cover and never less than 500 ft—and offering technical explanations, Mr. Holland presented a number of conclusions as guides toward prevention.

Since about 87% of the bumps have occurred on pillar-line points, pillar lines should be kept straight and without points. Avoid large spans if possible; otherwise, support them by heavy timbers. Pillars under heavy loads should not be split, but mined open-ended instead. Keep pillars all the same size. Plan the mine for complete extraction if any pillars are to be taken.

D. C. Jones, Kentucky state geologist, voiced the opinion that bumps in Harlan

BIG NEW 72-PAGE Mining Machine Parts CATALOG

Guaranteed Pittsburgh Parts

Here's the biggest and most complete catalog of replacement parts for loaders, cutters, locomotives, etc. ever published. It gives not only the teeth, pitch, and face—it gives you also the bore, metal specifications, and other pertinent information...plus... the model number of the machine. The guess-work is eliminated. You can tell exactly what to order.

For a free copy of PITTSBURGH GEAR'S new 101 catalog, fill in coupon and mail to us today

CONTAINS listings for

- General Electric
- Goodman
- Jeffrey
- Joy
- Myers-Whaley
- Oldroyd
- Sullivan
- Westinghouse

PITTSBURGH GEAR COMPANY
Neville Island
Pittsburgh 25, Pa.
Phone: SPaulding 1-4600

subsidiary of BRAD FOOTE GEAR WORKS, INC. • CICERO 50, ILLINOIS

Mail this coupon today

PITTSBURGH GEAR COMPANY
Neville Island
Pittsburgh 25, Pa.
CA

Please send me your new No. 101 Mining Machine Parts Catalog.

Your Name _____ Title _____

Company _____

Address _____

Town _____ Zone ____ State _____

COAL MEN ON THE JOB . . .

WESTMORELAND COAL CO., Hampton Mines, Madison, W. Va.: W. H. Hanlon (left), engineer; R. D. Rosenberry, chief clerk; H. M. Gilpin, chief coal inspector and laboratory technician; J. N. Shupe, preparation engineer, General Coal Co., Big Stone Gap, Va.; Glen Hyer, preparation foreman, Hampton Mines; and John Dolin, night tipple foreman.

County, Kentucky, can be eliminated or made very rare "if mining is done with due regard to the unusual amount and condition of the overlying strata." In his written discussion, Mr. Jones outlined the conclusions of a report made 20 yr ago for the Kentucky Department of Mines by John F. Maurice, Newell M. Wilder and himself. Keeping a long straight line is one of the important factors in preventing bumps.

In the Cumberland Overthrust Block, in which all the fatal bumps in Kentucky have occurred, the strong overburden has been broken, Mr. Jones reported. The mine pillar line should be parallel to one of the systems of joints that show as fine lines in the mine roof and also are further indicated by breaks over mined areas 2,000 ft to the surface. Mr. Jones attributed the primary cause of bumps to "(a) lack of knowledge of regional structure" and "(b) improper mining, both in detail and in large-scale extraction."

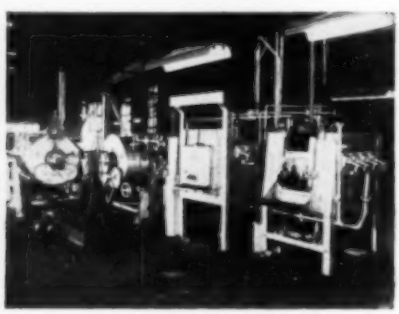
CONTINUOUS-MINING PROGRESS

In summarizing "Continuous Mining in Eastern Kentucky," R. W. Storey, chief engineer, Consolidation Coal Co. (Ky), concluded his paper by stating: "It can be said that if good roof conditions exist and if the machine is kept in pillaring a large percentage of the time, the operation should be successful. In fact, production should be equal to or greater than with conventional mining under the same conditions".

Mr. Storey described the Joy, Colmol

BACKSTAGE at BOWDIL . . .

. . . a glimpse behind the scenes to show you *WHY* Bowdil Products enjoy a reputation as the standard of the coal mining industry.



Latest type tempering, tool-hardening and carburizing furnaces give Bowdil products the right hardness, tensile strength and toughness. Every Bowdil Bit receives the most up-to-date heat treatment . . . for example, natural gas from our mains is first purified by a special generator, and another maintains constantly uniform temperature of quenching oil.

product performance depends on proper heat treating

SOLVE YOUR HANGING PROBLEMS

Hang Brattice Cloth • Water Pipe • Air Hose • Telephone Lines
FASTER . . . EASIER . . . WITH AMERICAN SPADS

No other method offers such streamlined production plus such valuable time savings for erecting brattice cloth, supporting electric wires, water pipes, telephone and air hose lines. American Spads are driven directly into the coal—thus eliminating all need for lumber—and cutting labor costs.

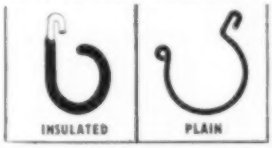
You can depend on American Mine Supply equipment for efficient and economical performance. It is backed by many years of scientific research and experimentation.

Enlarged view showing spad used to obtain an airtight seal in fastening brattice cloth for temporary stoppings, cross curtains, line brattice, etc.

AMERICAN SPAD HANGERS

are economical and time-saving—suitable for either side wall or roof suspensions. Just drive a Spad—clip on a hanger—and you have a quick, sturdy installation for pipe, hose or cable. Extra high tensile strength—ample for the most demanding installations.

The new insulated hangers have been especially developed for use with electric and telephone lines.



Specify American Spad Hangers, Plain or Insulated, for Quality and Economy. Plain—available in two styles: Lock Type and Open Type.

SPAD DRIVER

SPADS

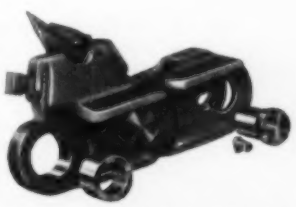
The SPAD DRIVER is a precision instrument specifically designed for use with American Spads. Investigate the proven performance—add up the advantages and the many savings—of this modern method.

AMERICAN MINE SUPPLY COMPANY

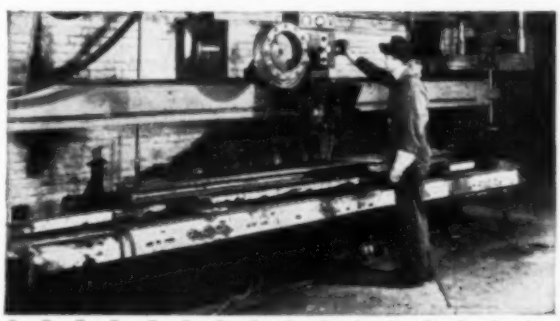
404 FRICK BUILDING PITTSBURGH 19, PENNA.

Additional Literature Upon Request

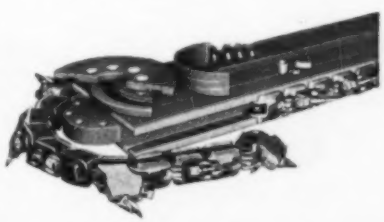
This new grinder, mounted on a floating base in our plant, assures accuracy to .0001" on the parts of Bowdil Chain that take the greatest abuse. Such attention to precision means longer life, trouble free service—results directly in power savings and less down-time for your operation.



our investment in precision pays you dividends



All-welded construction of Bowdil Bars has proved them superior in actual tests made by exerting measured pressure between 3 foot centers . . 4" thick conventional bars tested will bend with 25 to 35 tons pressure—3" thick Bowdil Bars will bend with 60 to 70 tons pressure.



modern welding is your assurance of product strength and durability

The BOWDIL CO. CANTON, OHIO

3 ways to be sure!

when you buy

PLASTIC PIPE

1.

CHECK WALL THICKNESS

CARLON more than meets the specifications of precision wall thickness established by the Thermoplastics Pipe Div., S.P.I.

2.

CHECK FOR SMOOTH, DULL BLACK FINISH

High gloss indicates incomplete dispersion of the ingredients. CARLON plastic pipe is precision controlled throughout manufacture to insure uniformity.

3.

CHECK THE GUARANTEE

Unconditional credit or replacement of pipe is the Carlon guarantee of the highest quality, dependability and performance in plastic pipe.

Write today for catalog.

ONLY Carlon MEETS ALL THESE TESTS!

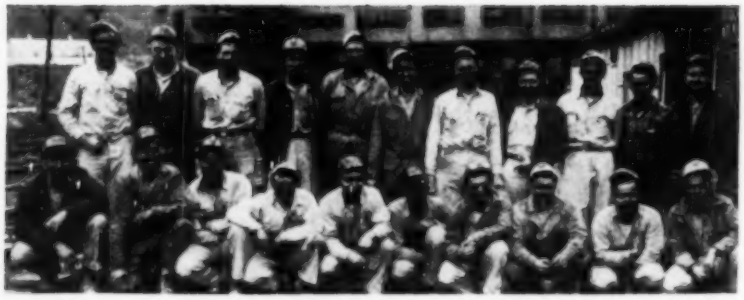
Buy the Pipe with the Stripe!

CARLON plastic pipe is produced in Ohio, Colorado, N. Carolina, Oregon, Texas & Ontario

CARLON CP

CARLON PRODUCTS CORPORATION

10300 MEECH AVENUE • CLEVELAND 5, OHIO



COAL MEN ON THE JOB . . .

Elkhorn No. 3 Mine, Pond Creek Pocahontas Co., Evanston, Ky.

TOP PHOTO, all section foremen, day shift, except as noted: Front row—Ray Wiley Sr. (left), Roy Ward, Ballard Fleming, Clayden Sherman, Paul Wetzel, Luther Russell, Ken Fields, general mine foreman; Roy Sherman, assistant mine foreman; James Castle, construction foreman; and Curtis Brooks, industrial engineer. Back row—Marvin Dixon (left), Clarence Gallimore, chief electrician; Emery Bartram, Damson Chafin, Ova Chandler, Ivory Wells, John Stiltner, Olen Knight, Cecil Sammons, Sam Gayhart and Eugene Cline, industrial engineer.

BOTTOM PHOTO, all section foremen, night shift, except as noted: Seated—Jess Hampton (left), Jack Grisby, Luther Sexton, Arnold Rains, Press Jennings and Marcus Hall. Standing—Don Frankline (left), Ralph Ward, K. D. Pettry, R. B. McKee, night mine foreman; Lonnie Steele, Andy Fields, Tunis Blackburn, Homer Richardson, Geo. Laxton, asst. mine foreman; M. M. McCormick, supt.

and Lee-Norse Junior Miner. At least five or six companies in eastern Kentucky have used or are now using continuous-mining machines. Both shuttle cars and short rubber-tired belt conveyors are represented in the haulage systems used. Production rates range up to 250 raw tons or more per shift and from about 10 to possibly 50 tons per faceman.

"Some of the machines," Mr. Storey said, "cannot do a satisfactory job of cleaning up loose coal on the floor of the entry. In some cases a loading machine is used to do this; in others the coal is shoveled by hand into shuttle cars or conveyors. Often 4 to 6 in of loose coal must be cleaned up after the machine has loaded all it can reach without excessive maneuvering".

Mr. Storey presented four mining plans for continuous mining, and pointed out that in this work good roof is almost mandatory for economical operation. Two methods of roof-bolting which result in only short delays to the continuous miner were mentioned by Mr. Storey. One is to bolt near the face during time down for lunch, cleanup, mechanical failures, etc. Another is to back out 10 to 20 ft and widen out the entry while bolts are installed near the face.

Questions on continuous mining were answered by a panel consisting of A. M. Ayres, superintendent, Russell Fork Coal Co.; Mr. Berry; and Paul G. Hall, graduate student, University of Kentucky. Mr. Ayres, who operates six Joy continuous miners, said that under the soft bottom conditions at Russell Fork the Joy cascade conveyors get more tonnage from a Joy miner on advance work, while shuttle cars get more from the same machine on pillar work. When machines are stopped about every 10 ft for bolting between the miner and the face, down time is about 2 hr. Substituting crossbars has cut the down time to about 1 hr.

Mr. Hall classified continuous-mining

THIS INSTALLATION is located at the Jamison Coal & Coke Co. Mine 21, Hostetter, Pennsylvania. Photograph retouched to show interior construction.

STOP BREAKAGE LOSSES with HOLMES LOWERING SPIRALS

- **No Droppage to degrade your coal**
- **No wear and tear on bins**
- **Costs nothing to operate**

Robert Holmes Lowering Spirals are designed to lower material through the use of centrifugal force, thus eliminating the need of an inside retaining lip. Each spiral is formed like a well-banked race track. The coal automatically slows down when it reaches the "safe" speed limit, regardless of the distance of travel.

As there is no retaining lip, the coal slides gently off onto the peak of the pile to form a natural angle of repose. In this way, the coal is spread out uniformly . . . a real advantage where segregation is a problem.

Lowering spirals are essential to proper handling in surge bins, run-of-mine storage bins and pockets, mine retail sales bins, and consumer storage systems.

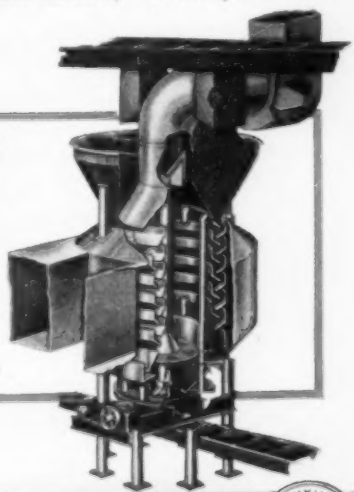
For Free Literature and Complete Details, Write Dept. A-30

DRY UP TO 60 TONS PER HOUR IN ONE PASS!

Baughman VERTI-VANE THERMAL COAL DRYER

Both low in initial cost and operating cost . . . each Verti-Vane unit is designed for capacities from 15 to 60 tons. It handles all coal sizes from 1½" down. Reduces surface moisture to approximately 2% in a "one-pass" operation. Minimum of moving parts and slow-speed operation tend to eliminate shift breakdowns and lost time. Easily adjusted for feed conditions . . . requires little attention.

Write for Free Catalog No. 101 Today. Please address Dept. A-30.



Bigger tonnages per day through continuous one-pass coal drying.

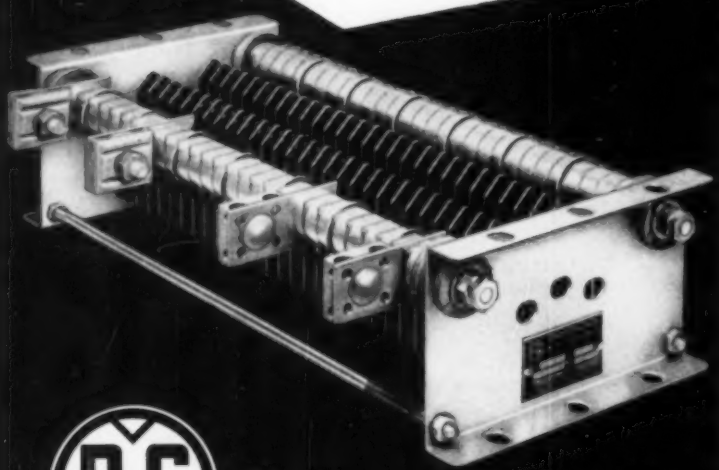
ROBERT HOLMES and BROS, INC.

DANVILLE ILLINOIS

DANVILLE HOLMES BROS. ILLINOIS

Manufacturers of: **SHEAVES, TIPPLE EQUIPMENT, CAGES, SKIPS, LOWERING SPIRALS, CAR PULLERS AND RETARDERS, DRYERS, LABORATORY CRUSHERS, HOISTS, VIBRATING SCREENS, DUSTOLATORS**

There is a *difference* in Resistors



P-G Resistors have proved this for many years

Different, because steel and mica, both extremely durable materials, coupled with P-G exclusive design produce a resistor of great mechanical strength. There is nothing to break. With accurate resistance values and adequate carrying capacities, P-G Resistors outlast ordinary resistors. Tell us your specifications and let P-G solve your resistor problem.

For any job . . . Where constant "trouble free" resistor service is wanted . . . you can safely specify P-G Steel Grid Resistors and get better performance with low cost maintenance.

The Nonbreakable Steel Grid Resistor

P-G

THE POST-GLOVER ELECTRIC COMPANY

• ESTABLISHED 1892 •

221 WEST THIRD STREET, CINCINNATI 2, OHIO

machines under two types: (1) chipping, which includes chains, disks and rotary cylinders; and (2) breaking, done by rotary arms. The second type is the most bulky and requires good bottom, but is continuous, is relatively simple to operate, has slow moving parts, fewer breakdowns and can be speeded up.

Advantages for the chipping type are maneuverability at the face, better adaptation to soft bottom and space for timbering, Mr. Hall said. Disadvantages are: need for a more skillful operator; higher speeds of parts, meaning more frequent breakdowns; and clean up that is not so good.

Mr. Berry said that his company, Clinchfield Coal Corp., started continuous mining only last June and is using 14-BU loaders back of them.

KENTUCKY MINE FIRES

Mr. Sisk presented brief descriptions of three explosions and 11 mine fires in Kentucky during the institute year. Two of the explosions were in tipples and one underground, the latter a coal-dust explosion caused by use of dynamite. Of the mine fires, six were outside and five inside. Four of inside fires were of electrical origin and one was caused by friction of a rubber belt.

Missouri Conference Begins on p 122

tageous. An adequate plant seldom fails to lower the cost of the overall mining and preparation process.

4. Automaticity—In coal mining, the big field of automaticity still lies ahead, though some advances have been made, notably in belt conveyor systems, pumping, coal hoisting, man hoisting, weighing, electric-power utilization, haulage-track systems and other operations. New discoveries and control appliances are bringing automaticity nearer every day.

5. Mining systems—The big problem, now partly simplified by continuous mining, is maintaining enough active places without having too wide a section. The newest systems involve one unit per panel, separate splits of air for each panel, elimination of doors, double lines of stoppings, longer panels, shorter pillar lines and development of a panel by a set of entries only.

6. Maintenance—Proper organization of maintenance work, facilities, parts handling, records, methods, training, etc., is one of the major mining problems today.

7. Travel time—Though a new portal costs money, it often pays off fast. Other ways to reduce travel costs are new mantrip cars designed for speed and safety, tighter mantrip schedules with fewer stops and delays, automatic switch throws, block signals and use of self-propelled cars, each of proper size to take an individual face crew to its own working place.

8. Oil- and gas-well hazards—New underground storage pools for gas, often placed beneath active coal mines, together with abandoned and uncharted oil and gas wells, create unsafe working

CUT WHEEL REPLACEMENT COSTS AT LEAST— 56%

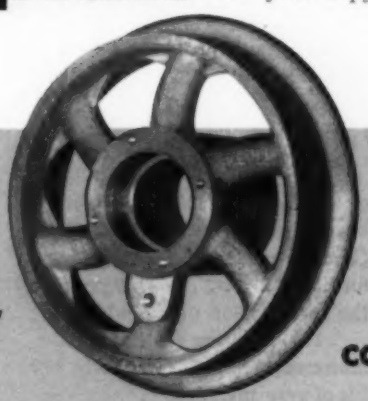
with the revolutionary

sterling plan

No additional capital outlay necessary!

Alert mine operators are always searching for new ways, new methods to reduce overhead and operating costs. One way they've found is to follow the STERLING Plan. For example, without spending a dollar more, you can re-wheel with STERLING cast steel wheels and save *at least 56 per cent in wheel replacement costs!*

STERLING cast steel wheels have uniformity of hardness *throughout*. In fact, they work-harden with each trip. This means less expensive, safer, more dependable transportation. STERLING cast steel wheels are precision balanced, and they *stay* in balance, preventing worn spots, eliminating load vibration. The STERLING Plan shows how *you* can cut operating costs substantially. Write for your copy of the STERLING Plan, today!



This new cast steel mine wheel reduces down-time losses, cuts repair labor costs!

SAFER
STRONGER
MUCH LONGER WEAR
COSTS LESS—*in the long run!*

THE sterling PLAN *will show you how much you will save!*

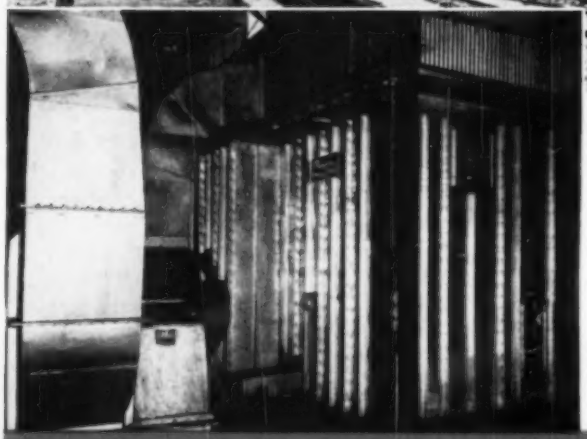
sterling
STEEL CASTING COMPANY
EAST ST. LOUIS • ILLINOIS

Gentlemen:
Of course I want to cut my wheel replacement costs. Send me the STERLING Plan right away. (No obligation, of course.)

Name_____
Title_____
Company_____
Address_____
City_____ State_____
No. of mine cars now in use_____

REPRESENTATIVES
Amos A. Culp, 930 Second Ave., North— BIRMINGHAM 4, ALA.
Marshall Equipment Co., 1842 Enslow Blvd.— HUNTINGTON, W. VA.
R. A. Thompson, Hotel Madison— MADISONVILLE, KY.
J. E. Mieser, 720 Roosevelt Ave., Mt. Lebanon— PITTSBURGH, PA.
Western Sales Engr. Co., 375 S. West Temple St.— SALT LAKE CITY, UTAH
Service Supply Co., James Squib, Howley Building— WHEELING, W. VA.

Mail this coupon today!



At the Itmann Plant of Pocahontas Fuel Co., Pocahontas, Va., dust is captured at the air plant (left) in Pangborn Dust Collectors.

Close-up of Pangborn Dust Collector operating within plant.

For more profitable coal preparation

Look to

PANGBORN DUST CONTROL

More mechanization and more production have helped the coal industry meet industry's vastly increased demands over the past decade. But they have created a serious problem for coal processing plants. If *you* face this problem—it will pay you to look to Pangborn Dust Control for the answer!

Pangborn Dust Control traps dust at the source—at tipples, dry cleaning, de-dusting and other operations. And Pangborn Dust Control saves you money, pays for itself by . . . (1) improving the reclamation of valuable dust . . . (2) lowering plant maintenance costs . . . (3) increasing the life of your machines because they operate in a cleaner atmosphere. What's more, higher morale and better health of employees mean increased production.

If you're losing profits because of excessive dust, let Pangborn engineers conduct a free Dust Pocket Survey. It costs you nothing but can mean big savings. Write today for details and your free copy of Bulletin 909A. Just address: PANGBORN CORPORATION, 2800 Pangborn Blvd., Hagerstown, Maryland.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

Pangborn DUST CONTROL

STOPS THE DUST HOG from stealing profits

conditions for miners. Legislative action doubtless will be needed to solve this problem.

9. Human relations—This is coal's main problem—the individual man. If management makes good production possible by correct planning, good working conditions, the right tools, well maintained machinery and supervisors who not only know what is to be done but understand what is necessary for good human relations, good production and low costs will come.

PROBLEMS FOR ANTHRACITE

Many problems beset the anthracite industry these days, said R. Emmet Doherty, engineer, Anthracite Institute. Among these are the following:

Roof support—Though timbering-costs are heavy and though many other types of support have been tried, wood remains the most popular material in anthracite mining. Other materials and methods include steel "I" beams and plate girders; combination steel and concrete supports, comprising steel legs with bearing plates, bearing sockets and a collar made of a thin steel beam placed under compression by a pair of truss rods; brick arches; piers made of poured concrete, concrete blocks or brick; steel-ring liner plates that are advanced one at a time; lightweight aluminum posts; collapsible steel props; and roof bolts. No one solution has been found that is satisfactory for all operations.

Water hazards—Anthracite mines pump an average of 25 tons of water for every ton of anthracite mined. To cope with the problem, operators have built large flumes at great cost, dug drainage ditches, back-filled cave holes and strip pits, widened and straightened streams and silted stream bottoms. The problem becomes more serious day by day and, unless solved—possibly with help from the federal government—doubtless will shorten the life of the industry, not to mention increasing the dangers to workers.

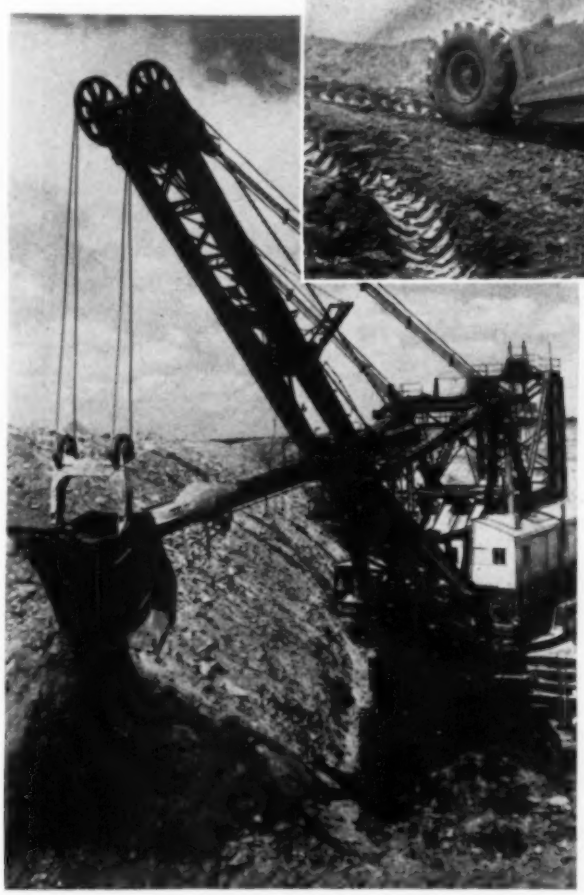
Ventilation—The cost of ventilating now exceeds the cost of drainage or roof support. No solution to the cost problem is in sight but the quality of ventilation is being improved steadily.

Mining methods—Some forms of hand-mining have not been changed substantially for 50 yr. On the whole, however, the industry is making progress, signified by the increasing number of conveyor belts, cutting machines and rotary drills. A continuous miner now is working experimentally in one mine.

Occupational disease—Direct cost of occupational disease in anthracite has totaled over $9,000,000 to 69 operating companies since May 30, 1946. Since that date, 3,747 claims have been filed. Of these, 2,284 have been awarded in favor of the claimant, 640 in favor of the defendant, and 255 withdrawn. Some 570 still are pending. Most of these claims arise from illnesses brought on by dust. Spurred by the need to improve conditions, an industry-sponsored drive involving 75% of the producing companies was begun in 1948. Now, there are few places where the concentration of dust particles exceeds 50,000,-

In strip mining operations...

AMOCO HDX is best.



The diesel engine is the heart of your stripping equipment. To keep it properly lubricated it's best to use Amoco HDX. This high detergent motor oil insures a cleaner engine, and a cleaner engine means more economical operation and longer engine life. Make it Amoco all the way.

AMOCO LUBRICANTS

FOR MINE MACHINERY

AMERICAN OIL COMPANY • FROM MAINE TO FLORIDA

...ride a "JEEP"

The Lee-Norse TJ1 Mine Jeep gets you there safely! Here's the best answer for speedier underground transportation to and from working faces and emergency areas for mine superintendents, engineers, inspectors and maintenance personnel. A versatile performer the Lee-Norse Jeep can be used to pull man-trip cars, fire-fighting equipment and can be quickly placed in service as an ambulance. Detailed data available on request. Write now!

...ride a "SCOOTER"

No reason for mechanics, pumpers, fire bosses and other maintenance personnel to lose valuable time hitch-hiking when there is a Lee-Norse Scooter at hand. Weighing approximately 1000 lbs., the Scooter is popularly priced and its low-operating cost fits into every mine budget. The Scooter has a 48" wheelbase, is 9' in overall length and is available in all track gauges from 36" to 48". Where time is a factor the Lee-Norse Scooter is a "must". Send today for complete information and prices.

Lee-Norse Company
CHARLEROI, PA.

000 per cubic ft. Water is the principal agent for controlling dust.

GASIFYING COAL UNDERGROUND

"My company has become interested in underground gasification of coal because of rising railroad rates, the high wage rates paid to miners, competition from oil and gas, and imports of residual fuel oil from South America," said T. C. Cheasley, vice president, Sinclair Coal Co. Briefly reviewing the history of underground gasification elsewhere, notably at Gorgas, Ala., Mr. Cheasley turned to cooperative experiments in electrocarbonization carried on at Hume, Mo., and later at Gorgas, by the Missouri School of Mines & Metallurgy, Hume-Sinclair Coal Mining Co., Alabama Power Co. and the U. S. Bureau of Mines. As developed thus far, the process involves three steps, as follows:

1. **Electro-linking** — Short-duration electrical heating that creates a fracture system in the coal bed which supports the succeeding gasification.

2. **Electro-gasification** — Simultaneous operation of electrical heating and blast by air or steam, which produces an enriched producer gas or water gas.

3. **Electro-carbonization** — Long-duration electrical carbonization, comparable to coke-oven operation, producing a 550- to 600-Btu gas, plus coal tar and ammonia. Residual hot coke can be gasified by air or even mined.

Without enriching agents, the gas is of low Btu value and transportation therefore would be costly, Mr. Cheasley explained. The answer may be to erect gas-consuming industrial or electric-power plants at the site, thus avoiding transportation charges. If boiler water is lacking, the gas turbine may offer a solution, since a unit now is being designed to use 90-Btu gas. Also, under controlled conditions of temperature, pressure and enriching feed, gas of various qualities may be produced that will be suitable for synthetic liquid fuels, heat loads of various types, or even pipeline transmission. "Underground electrocarbonization brings in a new potential phase of development of presently unminable coal reserves. The conversion and utilization of this potential energy should be one more answer to man's ever-increasing need for more goods for more people at lower costs," Mr. Cheasley concluded.

NATIONAL FUELS POLICY NEEDED

"We need a sound national fuels policy," declared Tom Pickett, executive vice president, National Coal Association, who spoke at the conference dinner Thursday evening. Mr. Pickett cited the following areas of growth opening up for coal: power for the Atomic Energy Commission, power for metals refining and processing, chemicals, the coal-fired gas-turbine locomotive, and gasification and liquefaction.

But the industry faces tough problems, Mr. Pickett said. These problems are rising costs of production, changes in coal's historical markets and competi-

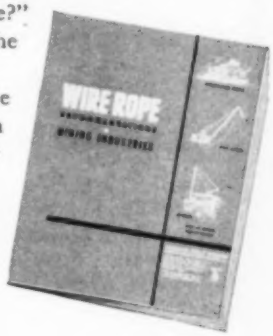
an ACCO product

TRU-LAY Preformed WIRE ROPE

Why Should the Shovel's Hoist Line be Lang Lay?

● Among other reasons, it has more of each wire exposed to wear and will last longer. We might also ask "Why should flattened strand be used for the scraper's cable?" An answer would be—it lasts longer because its relatively flat surface spreads the wear better.

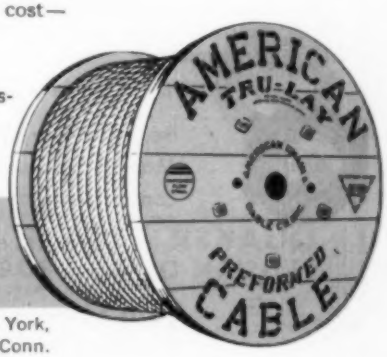
Four different wire ropes are used on the two machines illustrated, three on the shovel and one on the scraper. Each rope is a different construction, and each construction recommended was decided upon by American Cable's engineers after years of careful recording of results of many, many field studies.



This Book Gives Recommendations

Recommendations based on these records are listed clearly in the 12-page "Wire Rope Recommendations for Mining Industries" which shows the best TRU-LAY Preformed construction for the machines you operate. It's full of pictures which makes it easy to find the recommendation you need. Here is a booklet which will help you get longer service—which means lower cost—from every wire rope you use.

See your nearby American Cable distributor who stocks popular TRU-LAY Preformed "Green Strand" Wire Ropes, or write our Wilkes-Barre, Pa., office for your free copy of **DH-128-A** "Wire Rope Recommendations for Mining Industries."

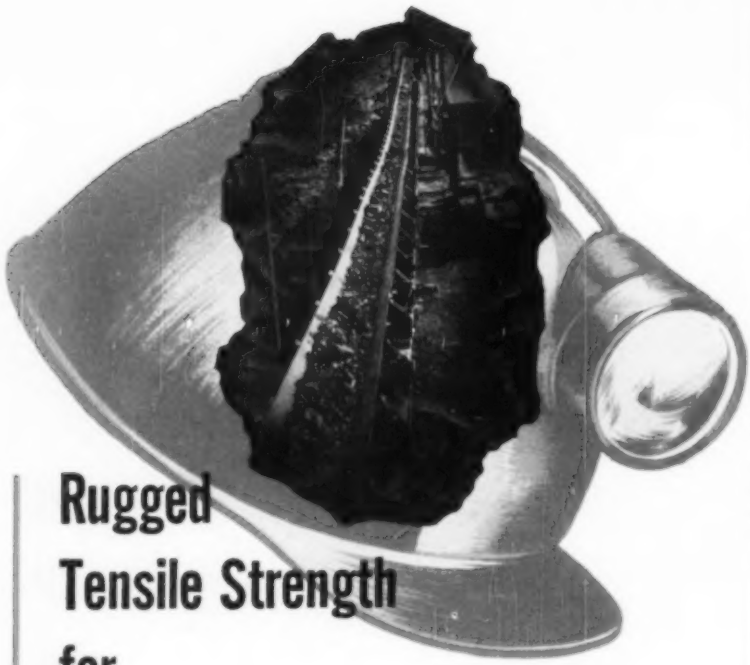


ACCO

TRADE MARK

AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.



Rugged
Tensile Strength
for
TOP TONNAGE HAULS

Quaker

MAINLINER
CONVEYOR BELT

Ideal for tough loads, high lifts and long center distances. Steel-like in strength, yet highly flexible for easy troughing. Twice as strong as similar gauge cotton belts. Resists deterioration by water, oil, weather. These are only a few of the advantages of the Quaker Mainliner . . . made of multiple ply strong duck, with nylon woven across the width and high strength cotton woven lengthwise. For low cost, top-tonnage conveying, use the Mainliner . . . another Quaker quality product for long wear and top performance.

Write for name of nearest distributor

Belting, Hose, Packing and
Moulded Rubber of every
construction for every need.

QUAKER RUBBER CORPORATION
DIVISION OF H. K. PORTER COMPANY, INC.
OF PITTSBURGH
PHILADELPHIA 24, PA.
Branches in Principal Cities

tion from rival fuels which, in some instances, benefit by concessions that have the effect of federal subsidy. Pointing to imports of residual fuel oil from South America as the most dangerous threat to coal, with the use of natural gas for inferior steam-raising purposes next in line, Mr. Pickett urged all segments of the coal industry to join in the fight for fair treatment. Dean Curtis L. Wilson, Missouri School of Mines & Metallurgy, was toastmaster at the dinner.

PREPARING LIGNITE

About 75% of the Nation's reserves of lignite lie in North Dakota, said R. C. Ellman, USBM, who was lead-off speaker at the Friday morning session. This session, devoted to problems and practices of coal preparation, was guided by M. D. Cooper, director, Mining Engineering Education, National Coal Association, as chairman.

With unconsolidated overburden, few faults, thick seams and a low ratio of overburden to lignite, stripping conditions are favorable, with some 90% of total production now being strip-mined, Mr. Ellman explained. Over 3,000,000 tons per year now is being produced, with the major output coming from large strip operations.

Lignite, much of which is stripped in summer and mined in winter, is produced mostly in large, flat slabs, with moisture ranging from 35 to 40%. As moisture decreases, lignite shrinks and breaks into smaller fragments. In weather, it deteriorates quickly. Ash runs 5 to 8%; sulphur, below 1%; voltatile matter, from 30 to 35%. Biggest tonnages now go to power plants and industrial boilers, much of the domestic market having been lost in recent years.

In preparing lignite for market, producers need crushers specially designed for the tough, resilient structure of lignite, Mr. Ellman said. Double-tooth roll crushers with capacity of 2,000 to 3,000 tons per shift are used at most lignite tipples. Lignite is not washed but is crushed and screened to produce stove, lump, stoker and industrial stoker sizes. Severe weather in North Dakota, with frequent rains, snow and sleet, creates serious problems in handling and transporting lignite and in maintaining tipple machinery, and degradation accompanying loss of moisture, with resultant dust, is an obstacle to home use. The best answer found thus far to these problems is oil treatment.

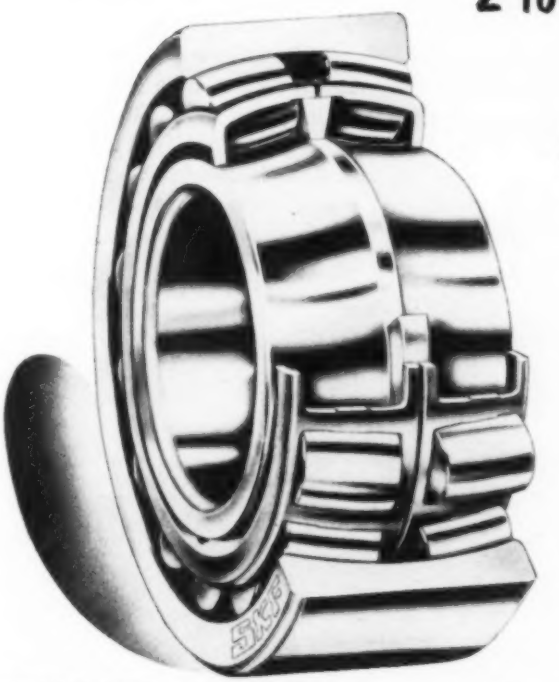
The goal of lignite producers is to obtain a uniformly dried and sized product and to upgrade lignite to reduce transportation costs per unit of heat, Mr. Ellman said. New developments looking to this goal include two drying processes, neither of which is yet fully matured: (1) a steam-drying method, which causes shrinkage rather than fracture and reduces moisture to 12 to 20%; and (2) a stream drying method, devised by the USBM at Golden, Colo., and now being used by Texas Power & Light Co. to prepare boiler fuel for a new steam station serving the new aluminum plant in Milam County, Texas. The latter process cuts moisture to 5% or less.

With both processes, however, storage

IMPORTANT for Bearing Buyers

NOW... from BEARINGS, Inc.

2 to 3½ Times Longer Service with the New SKF Spherical Roller Bearing



Bearings, Inc., as the authorized distributor of SKF Bearings, brings you another first in improved bearing design. During more than 4 years of testing, thousands of installations were made, including many shaker screens. Bearing life was increased many times over other bearings.

COMBINED LOADS: This great forward step in bearing design provides a Spherical Roller Bearing capable of carrying heavier combinations of radial and thrust loads or pure thrust loads of greater magnitude.

SELF-ALIGNMENT: The important self-aligning features of SKF Spherical Roller Bearings has been preserved, so that considerable misalignment between the shaft and housing has no ill effect whatever on bearing capacity or life.

INDIANA: Ft. Wayne • Indianapolis • Lafayette • Muncie • Terre Haute
NEW JERSEY: Camden • **OHIO:** Akron • Canton • Cincinnati • Cleveland Columbus • Dayton • Elyria • Hamilton • Lima • Mansfield • Toledo • Youngstown Zanesville • **PENNSYLVANIA:** Erie • Johnstown • Philadelphia • Pittsburgh Reading • York • **WEST VIRGINIA:** Charleston • Huntington • Wheeling

MEMBER AFBDA

Bearings, Inc.
3634 Euclid Ave., Cleveland 15, O.

Gentlemen:
Please send me complete information on the new SKF Bearing.

Name .....

Firm .....

Address .....

City ..... Zone ..... State .....

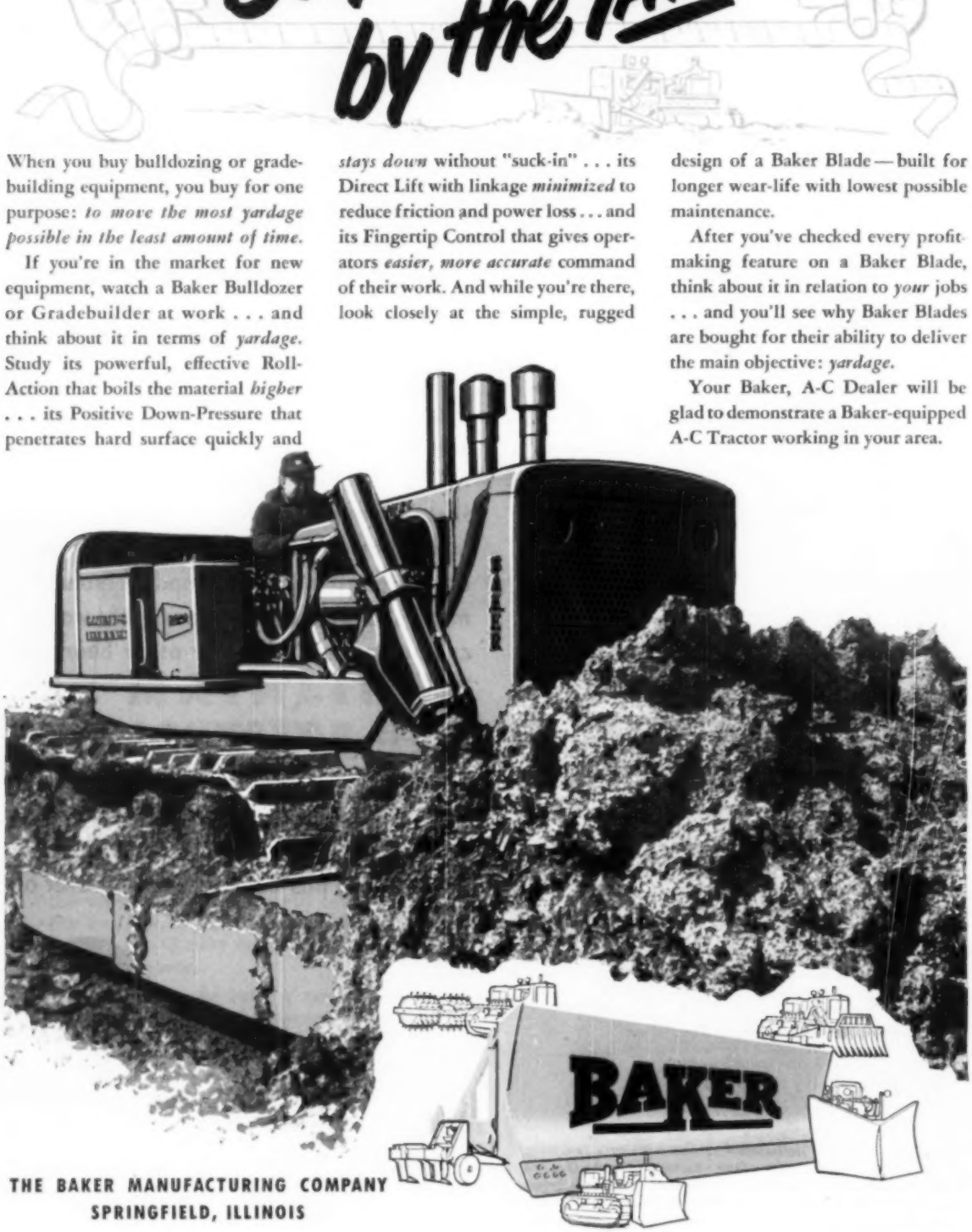
Buy 'em by the YARD

When you buy bulldozing or grade-building equipment, you buy for one purpose: *to move the most yardage possible in the least amount of time.*

If you're in the market for new equipment, watch a Baker Bulldozer or Gradebuilder at work . . . and think about it in terms of *yardage.* Study its powerful, effective Roll-Action that boils the material *higher* . . . its Positive Down-Pressure that penetrates hard surface quickly and *stays down* without "suck-in" . . . its Direct Lift with linkage *minimized* to reduce friction and power loss . . . and its Fingertip Control that gives operators *easier, more accurate* command of their work. And while you're there, look closely at the simple, rugged design of a Baker Blade — built for longer wear-life with lowest possible maintenance.

After you've checked every profit-making feature on a Baker Blade, think about it in relation to *your* jobs . . . and you'll see why Baker Blades are bought for their ability to deliver the main objective: *yardage.*

Your Baker, A-C Dealer will be glad to demonstrate a Baker-equipped A-C Tractor working in your area.



THE BAKER MANUFACTURING COMPANY
SPRINGFIELD, ILLINOIS

is a problem, since dried lignite regains moisture in storage and often ignites spontaneously, Mr. Ellman reported. But transportation in boxcars, stratification and compaction of sizes in storage piles and pelletization of small sizes may prove to be satisfactory solutions for these problems.

SEEKING THE ANSWERS IN BITUMINOUS PREPARATION

Face preparation as well as surface preparation creates problems in bituminous, said Dr. C. J. Potter, president, Rochester & Pittsburgh Coal Co.

The biggest market for bituminous these days calls for minus 1-in sizes, including fines and mesh sizes, Dr. Potter reported. Yet these are the sizes that create the dust that industrial customers object to. These sizes also pose new preparation problems. Yet, with mechanized mining, there is no way to avoid producing fines. Even the coal plow does not reduce fines appreciably nor does ventilation, though improving, carry away all the dust.

Underground, coal preparation is complicated by the need for water to allay dust, by rockdust and by full-seam mining. Water causes screens to blind, and rockdust and partings add a heavy load to preparation-plant operations.

In the surface plant, preparation problems may be grouped under four headings, as follows, Dr. Potter explained:

1. Cleaning and drying—Coarse sizes still must be handpicked at the start, with resultant high labor costs, but coarse-coal plants on the whole perform satisfactorily. In the low-gravity small sizes, heavy media works well. But for sizes below 10-mesh, jigs are not satisfactory nor is heavy media infallible. In drying, the big problem is degradation.

For fine sizes down to 10-mesh, air cleaning often is used, though it requires prior removal of some moisture. Feed to dry cleaners must be accurately presized, which is not always practicable. Concentrating tables, on the other hand, handle a wide range of sizes down to 65-mesh but no method exists for making a low-gravity separation on tables.

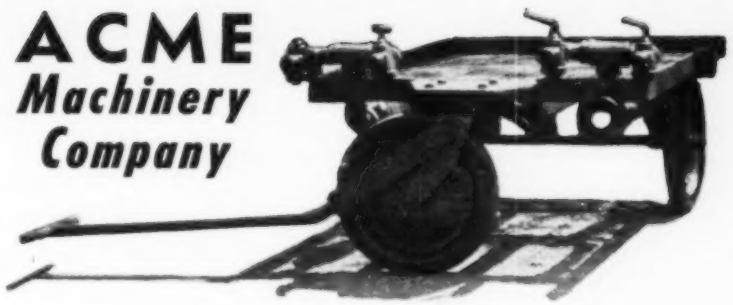
As for drying fine sizes, the three types of equipment available, though fairly satisfactory, are weak in the following respects: centrifugal dryers are costly and increase degradation; heat dryers often raise the temperature of the coal; and flash dryers cause degradation.

2. Sizing and treating—Sizing and treating methods are determined mostly by the demands of customers. Dust and agglomeration of fines must be minimized.

3. Solids disposal—The attitude of the courts has hardened recently, especially on gob fires and air pollution. Methods exist for minimizing these problems.

4. Fluids disposal—Plant fluids include small dust particles discharged from air dryers as well as waste water from the plant. No answer has yet been found to the dust problem. Bag filters cannot withstand the exhaust heat, which runs around 200 F; orlon bags are too expensive; small cyclones are not adequate; scrubbers do not always perform satisfactorily; and electrostatic precipi-

ACME Machinery Company



Offers this new useful unit

Push Around Utility Buggy

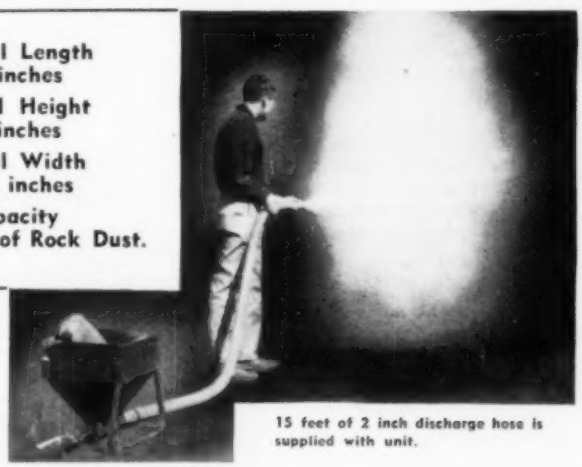
Built in 2 sizes — 3′ x 4′ and 4′ x 5′.
Designed for hauling stopers and other rock drills.

FEATURES ARE: 1—Built in line oiler
2—Built in pressure gauge
3—Air Filter
4—Valve Manifold

IMMEDIATE DELIVERY on either the 3′ x 4′ or 4′ x 5′ sizes

ACME also offers this
Handy Rock Duster
where compressed air is available

Overall Length
20 inches
Overall Height
17 inches
Overall Width
14¼ inches
Capacity
94 pounds of Rock Dust.



Will empty 1 — 50 pound Rock Dust Bag in approximately one minute or less.

15 feet of 2 inch discharge hose is supplied with unit.

Write, wire or phone for quotations.

IMMEDIATE DELIVERY

ACME MACHINERY CO.
BOX 1169, WILLIAMSON, W.VA.
PHONE 1854

tators are high in cost and create an explosion hazard.

Turning to current practices in bituminous preparation, Dr. Potter described methods used by his own company. Sizes from ¼ to ⅛ in go to tables where, by elimination of impurities, overall size is degraded. The coal then goes to settling tanks, whence the minus 100-mesh goes to thickeners, the ¼ x ⅛ to screen dryers and the ⅛x100-mesh to centrifugal dryers and filters, followed by flash or heat dryers.

A recent change has been to convey the ⅛x100-mesh fines from the settling tank to a stainless-steel horizontal filter, on which the coal forms a bed. The top 3 in of this bed is scraped off and the remaining 1 in of coal is left to form a filter bed. The underflow from the thickener then is fed onto the filter bed. This procedure eliminates the centrifuge and thus decreases degradation, Dr. Potter reported.

C. W. Waterman Jr., McNally Pittsburg Mfg. Corp., commenting from the floor, stated that dense media methods now are being made available for washing sizes up to 12 or 14 in, thus eliminating handpicking altogether.

PREPARING ANTHRACITE FINES

By and large, the anthracite industry sells its domestic sizes, constituting some 53% of production, at a profit, and its steam sizes at a loss, said H. R. Hagen, engineer, Philadelphia & Reading Coal & Iron Co. One trouble with this sales pattern is that the steam market is the stable market with bulk sales, whereas the domestic market fluctuates with the weather. Another trouble is that there has been a sizable degree-day deficiency in the anthracite market area in recent years, with resultant loss of tonnage.

Most anthracite producers use a central breaker for all mines, thus obtaining a favorable blend to meet market needs and consolidating transportation, water supply, mine-water treatment, refuse disposal, silt storage and waste-water disposal, Mr. Hagen explained. In P&R operations, all coal except flotation coal is prepared by wet gravimetric methods, with cones for large sizes and hydrotators for smaller sizes.

Tracing briefly the progress of anthracite through P&R's St. Nicholas, Locust Summit and Oak Hill breakers, Mr. Hagen turned in some detail to the flotation of 10x200-mesh anthracite fines in a new plant adjacent to the Locust Summit plant (*Coal Age*, Dec., 1952, p 96). From that flotation plant, fine coal has been entering new markets since the plant's erection in 1950. Essentially, the cleaning process, accomplished in Laseter cells, involves very small non-soapy bubbles that attach themselves to particles of coal and carry them to the surface of the medium, where the coal is removed by rakes as a relatively dry matte containing a large quantity of plus 28-mesh material. The cell itself contains a turbulent mixing, agitating and aerating zone at the bottom; a relatively quiet teetered classifying zone in which

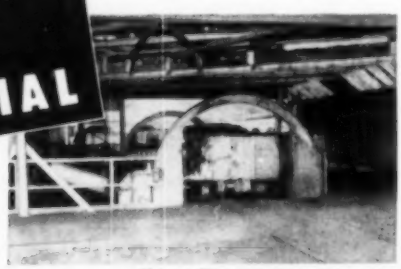
YOU'LL DO BETTER *with* DIFFERENTIAL

THE COMPLETE MINE HAULAGE SYSTEM

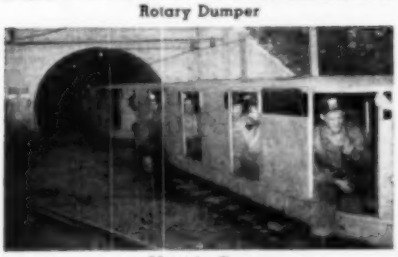
Examine the facts and, chances are, you'll specify Differential.

Every type of mine hauling equipment — locomotives, mine cars, rotary dumpers, mine supply cars, air dump cars, rock larries, ballast cars, mantrip cars — can be supplied. Our engineering and sales counsel are available to you without charge — yours for the asking.

Only Differential offers the complete mine haulage system.

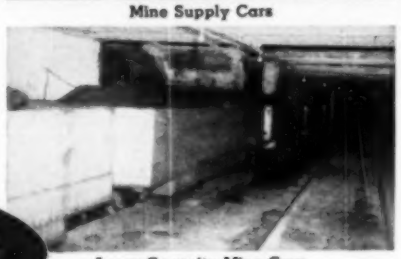


Rotary Dumper



Mantrip Cars

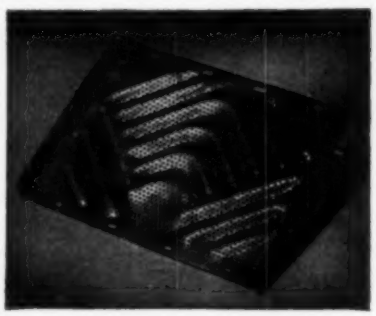
Mine Supply Cars



Large-Capacity Mine Cars

DIFFERENTIAL STEEL CAR COMPANY FINDLAY, OHIO

SINCE 1915—PIONEERS IN HAULAGE EQUIPMENT



"W" DENTED SHAKER SCREENS

A "must" when it comes to obtaining an efficient job! *Good* because the spreading and collecting riffles give uniform spread of material over the entire screen surface . . turns the top and middle flow of material down in direct contact with the screen . . . gives an increased screening efficiency up to 33% on fine sizes over an undented flat screen.

Comes in Carbon and Stainless Steels and Manganese Bronze. No sag.

Write us today. We shall reply promptly.

REMALY MANUFACTURING CO., INC. TAMAQUA, PA.

SUPERLA
REG. U. S. PAT. OFF.
Mine Lubricants

One for all...

More and more midwest mines are realizing important savings through the versatility of SUPERLA Mine Lubricants. Inventories have been simplified and over-all lubrication costs reduced.

In one mine, a SUPERLA Mine Lubricant was adopted for use in main transmissions and gathering heads of Joy loaders and in the wheel bearings of coal cars as well. In over three years' operation, there has been no downtime because of scored clutch plates or faulty lubrication. In the cars, leakage of lubricant from bearing housings has been eliminated.

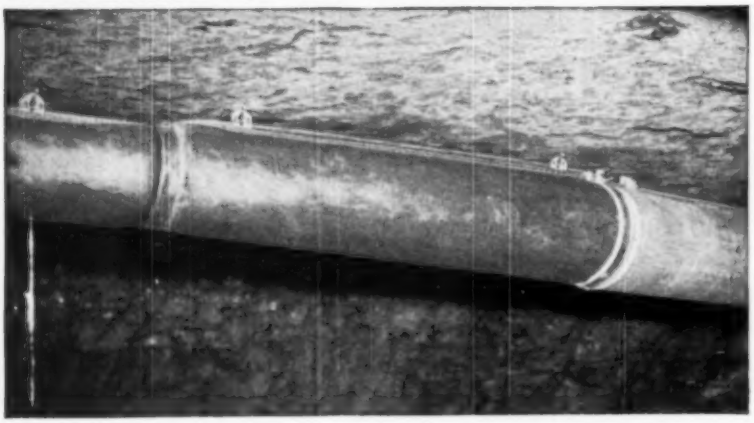
Also in this mine, a SUPERLA Mine Lubricant has provided trouble-free lubrication in the transmissions of Goodman loaders and in the gear cases of cutting machines. In more than three years of operation, there have been no cases of downtime of loaders or cutters due to faulty lubrication. Warm-up time for the loaders has been eliminated.

These are the big jobs, but the versatility of SUPERLA Mine Lubricants covers a wide range of applications from motor armature bearings to loading machine hydraulics. The chances are you can replace several special-purpose lubricants with one or two SUPERLA Mine Lubricants and get better lubrication results in each case. There's a Standard Oil lubrication specialist located near you who knows mining equipment and who will work closely with you. To reach him, you need only call your local Standard Oil office, or write: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY STANDARD *(Indiana)*

SPECIFY

FLEXIPIPE® the quality ventilating tubing



Flexipipe is now available with Rope Seam Suspension *at no additional cost.* The newest, best, quickest suspension . . . eliminates special accessories and suspension wires . . . *all you need is a nail.* It equalizes strain on the tubing.

Flexipipe is efficient, serviceable, economical. Jute and heavy-duty grades available in a variety of lengths and diameters to meet your requirements.

Write for complete information and sample.

Bemis Bro. Bag Co.

408-O Pine St.,
St. Louis 2, Mo.

The Swing is to Durakool Factory Set Timer Relays

FACTORY SET, TAMPER-PROOF TIMING

Practically non-breakable, Durakool **Factory Set Timer Relays** have more than proved themselves on the roughest and toughest jobs that could be found. Year by year, their use increases in sensational fashion.

Controlled time available from .15 to 20.0 seconds in either normally open or normally closed actions. No waiting. Your production schedule is met.

See telephone directory for local distributor or write for Bulletin 800

★ No false contacts
★ No chatter
★ Quiet in operation
★ Low in cost

DURAKOOL, INC., Elkhart, Indiana
50 St. Clair Ave., W., Toronto

Durakool ALL-STEEL MERCURY Timers

floatable and partly floatable particles are separated, a quiet flotation zone where floated particles collect as a matte for removal; and a flotation-concentrate removal zone. Middlings may be collected in a separate removal zone and returned to the same float cell for retreatment. Cells are arranged in batteries of six primary and two secondary units.

At the beginning of the project, some 10 to 15 yr ago, company officials set up specifications for the process as follows, Mr. Hagen recalled: clean the fine sizes in waste water from breaker operations (an upper size of 10-mesh) in one process, without the use of screens, filters or dryers. These specifications are unchanged today. Feed now comes from the breaker when it is operating; otherwise, from sludge deposits that have been accumulating for over 20 yr and are estimated to contain over 10,000,000 tons of material.

Conditioning of the slurry with kerosene takes about 8 min. The frothing agent is a long-chain alcohol. Concentrate from the six-cell primary train is loaded directly into railroad cars. Tailings from the primary circuit are carried to a thickener, the underflow from which becomes the feed to the secondary cells. In the secondary circuit, kerosene as a conditioner and alcohol as a frother are added, and the flotation product is returned to the primary circuit.

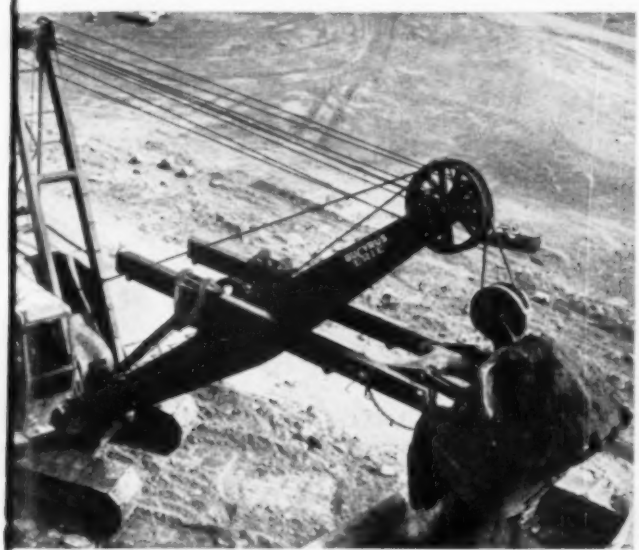
Moisture in the flotation coal is reduced by siphoning from the top of the railroad car and by gravity drainage by means of special caulking of the hopper cars, Mr. Hagen explained. Moisture after drainage totals 12 to 15%, including about 3% inherent moisture. The end product is ideal for power plants, sintering, briquetting and other industrial uses.

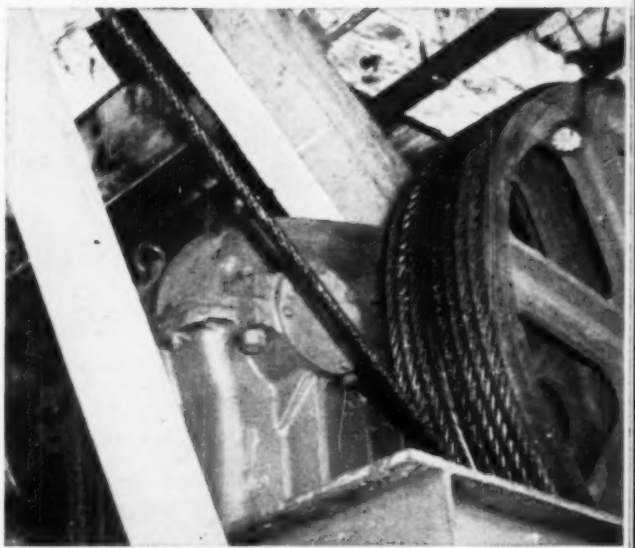
COAL FOR ELECTRIC POWER

The power load of Union Electric Co. of Missouri has doubled every 10 yr, said John K. Bryan, fuel engineer of the company, who was the first speaker at the Friday afternoon session on coal utilization and markets. David T. Beals, vice president, Crowe Coal Co., presided at this session.

Tremendous growth in demand for electric power and steady improvement in plant efficiency have marked the utility industry since erection in 1882 of the first steam-electric power station, 600-kw capacity, on Pearl St., New York City, Mr. Bryan said. That station required 10 lb of coal per kilowatt-hour generated. In contrast, the new Meramac station of Union Electric Co. produces a kilowatt-hour from less than 0.8 lb of coal. Meanwhile, between 1913 and 1953, Union Electric's annual use of coal increased from 300,000 to nearly 3,800,000 tons.

With the commercial use of nuclear fuel still a long way off, coal looms larger and larger in the utility fuel picture, Mr. Bryan observed. And though it will be harder to increase efficiencies in the years ahead, improvements will be made. For instance, $30,000 has been invested in coal-sampling equipment at the Meramac station. The result will be higher boiler efficiency. Also coal-handling, which has resisted centralization, now is being centralized at Meramac and elsewhere. In





EXTRA FLEXIBILITY—Wire rope encounters fast sheave action, reverse bending, constant stop-and-start operation on many jobs. When this same rope must also lift or pull heavy loads, an unusually flexible, strong wire rope is needed.

Rope jobs like paver skip hoists, overhead cranes, large shovel and dragline hoists, and sawmill carriages demand these qualities. That's where the use of 6 x 37 Red-Strand wire rope saves time and money.

Where will 6x37 Red-Strand improve your wire rope service?

Look at a cross section of 6 x 37 wire rope. You see three rings of small, uniformly sized wires in each strand. This differs from a rope construction like 6 x 19, which contains fewer and larger wires.

The *smaller size* wires make 6 x 37 more *flexible*. The *larger number* of wires maintains rope *strength*.

Would this combination improve your wire rope service? Would it solve a problem for you? Leschen's higher-than-rated quality is also providing longer-than-expected service to heavy industry everywhere.

Check with your Leschen man. He can help you.

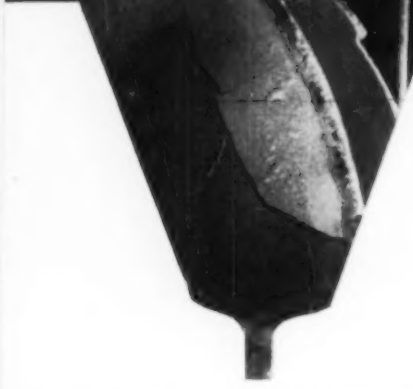
Leschen's 64-page Wire Rope Handbook tells you all about 6 x 37 and other Red-Strand wire rope constructions. Ask or send for your free copy.

6 x 37

6 x 19

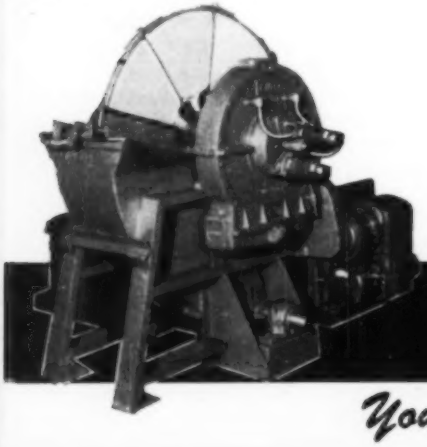
LESCHEN WIRE ROPE DIVISION
The Watson-Stillman Company
(A SUBSIDIARY OF H. K. PORTER COMPANY, INC.)
St. Louis 12, Missouri

LESCHEN
HERCULES Red-Strand
WIRE ROPE



Eimco Agidisc filter detail above shows how cake breaks free from filter bag when blow is applied.

Below: An Eimco single disc pilot model filter is available on rental or lease basis to test the dewatering of your fine coal products in your own plant.



Eimco Agidisc Filters Increase Salable Tonnage

Dewatering coal fines on efficient Eimco Agidisc filters will permit you to produce a maximum of salable product per ton of coal transported to the surface.

Eimco filters used for dewatering coal fines have been carefully engineered and built specifically for the coal washing application. Their use in processing flow sheets is an economical must for maximum profits.

Eimco filters used in dewatering coal fines have been selected by most progressive companies because: (1) Eimco offers the only reliable, heavy-duty unit for the job that is simple and free of trouble making gadgets. (2) Eimcos will operate continuously with a minimum of attention. (3) Cakes on Eimco filters are smooth and uniformly dried over the entire surface. (4) More tonnage is filtered per square foot per hour. (5) Eimco discs and Agidisc occupy less floor space per foot of filter area. (6) Better filter bag life, and many other advantages.

Copies are still available of the paper "Economic Dewatering of Coal," by Silverblatt & Dahlstrom, presented at 1953 Joint Fuels Conference sponsored by Coal Div. A. I. M. E.

THE EIMCO CORPORATION

Salt Lake City, Utah, U.S.A.

Export Office: Eimco Bldg., 52 South St., New York City

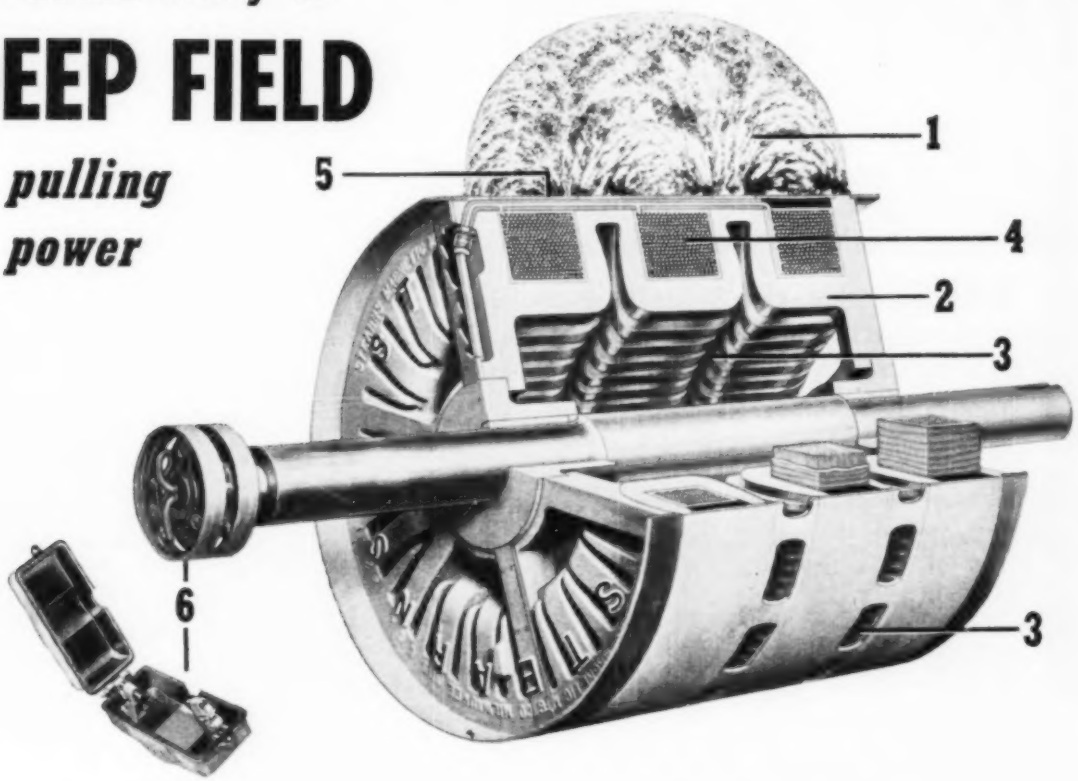
EIMCO

You Can't Beat An Eimco

Inside story of

DEEP FIELD

pulling power



STEARNS ELECTRO-MAGNETIC PULLEY

Here you can see at a glance why powerful Stearns electro-magnetic pulleys effectively remove tramp metal from conveyor lines even though material flow is fast and belts are heavily loaded.

Check these six big features:

1. **Magnetic Field.** Deep, strong, magnetic field provides maximum pull when tramp metal is trapped between large pieces of bulk material.
2. **Magnet Body.** Solid, one-piece dynamo steel casting. No tie rods to loosen and cause trouble.
3. **Air Cooling.** Constant stream of cool air to pulley interior dissipates heat fast, keeps magnetic strength high.
4. **Coil Windings.** High dielectric insulating varnish is baked on, covered with spun glass fiber insulation, then sealed with bakelite varnish. Welded, not soldered coil joints.
5. **Coil Covers.** Steel covers eliminate dead spots — distribute magnetic force lines uniformly over pulley face.
6. **Collector Rings, Brush Holders and Housing.** Bronze collector rings are bakelite-insulated, machine-fitted to shaft and enclosed in shock-resistant cast-iron housing which contains heavy bronze brush holders.

Magnetic Pulleys of the permanent magnet type also available where indicated or desired. Write for descriptive catalog 303B.

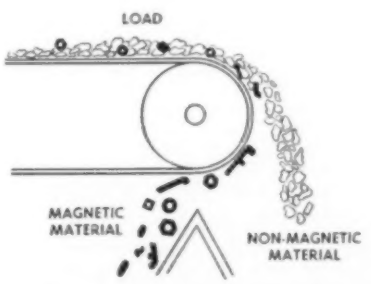


Diagram showing how Stearns magnetic pulley removes tramp iron.

1065

MAGNETIC EQUIPMENT FOR ALL INDUSTRY

STEARNS MAGNETS

STEARNS MAGNETIC, INC. 661 South 28th Street, Milwaukee 46, Wis.

Proven

1 The rapidly growing list of Coal Mines using Barney Type Car Spotting is unquestionable Evidence of its Value for Increasing Production.

2 The Superiority of the STAMLER HYDRAULIC CAR SPOTTER is proved by its selection after rigid tests and the examination of Outstanding Performance Records wherever used.

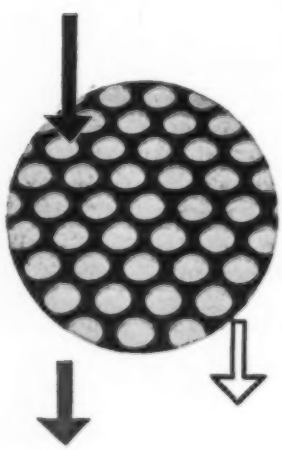
3 May we submit this Proof to You?

PARIS . . .
KENTUCKY
SCHROEDER BROS.
EXCLUSIVE SALES AGENT,
PITTSBURGH, PA.

THE W. R. STAMLER CO.

In Coal Preparation

it's the SIZE that counts!



You can rest assured your material will be accurately sized if you use Hendrick Perforated Plate on vibrating and shaking screens. With Hendrick Perforated Metal Plate, screens last longer, openings remain uniform under constant, heavy-duty usage.

Delays due to costly blinding are reduced to an absolute minimum – decks can be changed easier, faster—and downtime for repairs is practically eliminated – when Hendrick Perforated Plate is used.

Available flat, corrugated or stepped with any desired shape and size of perforation in proper gauges of regular, high carbon, and high tensile steels and in other commercially rolled metals. Write for more details.

Hendrick
MANUFACTURING COMPANY
41 DUNDAFF STREET, CARBONDALE, PA.
Sales Offices in Principal Cities

PERFORATED METAL • PERFORATED METAL SCREENS • WEDGE-SLOT SCREENS
ARCHITECTURAL GRILLES • MITCO OPEN STEEL FLOORING • SHUR-SITE TREADS • ARMORGRIDS

addition, larger and more efficient boilers are being installed, with 200,000-kw machines now in operation and 260,000-kw machines on the drawing boards. Furthermore, superheating and reheating techniques, together with higher temperatures and pressures, are pushing efficiency upward. Even so, Mr. Bryan said, out of every 100 Btu produced in powerplant boilers, only 35 Btu goes to the transmission lines, with some 15 Btu escaping through the stack and about 50 Btu being discharged to cooling water.

Turning to coal characteristics that determine the cost of producing steam, Mr. Bryan listed the following: grindability, size consist, sulphur content, moisture, ash and ash-fusion point. On the whole, however, modern boiler design permits the use of a wide range of coals in steam-electric plants, much of which coal may be inferior to that needed by other industries.

BOOSTING COAL FOR CHEMICALS

Coal can fit into growing markets for chemicals, said E. C. Medcalf, Coal Tar Chemicals Department, Calco Chemicals Div., American Cyanamid Co. At the start of World War II, he explained, the petroleum industry moved into the benzene market because the coal-chemicals industry was unable to fill rapidly growing needs on short notice. Since that time, petroleum interests have moved vigorously into production of other chemicals that might well have come from coal. Petrochemical plants were built at a time when high prices were obtainable for products and when, in contrast, price ceilings were clamped tight on coal chemicals.

But there appears to be no limit to the growing demand for chemicals, Mr. Medcalf stated. The market outlook means new opportunities for coal, especially in production of the following:

Benzene—Benzene is used for fuel and for production of styrene, phenol, aniline, nylon, detergents and many other end products for which there is a growing need. Prices now are high, especially for petroleum benzene, which is free of sulphur. The government is encouraging coke-oven operators to recover more benzene from ovens and to improve the quality of their product.

Xylene and toluene—These chemicals, produced in quantities from petroleum during and since World War II, are in great demand. They can be produced equally well from coal.

Aniline—Aniline, derived from coal and petroleum, though not the biggest chemical in volume, is the most versatile of all, with some 75 primary derivatives.

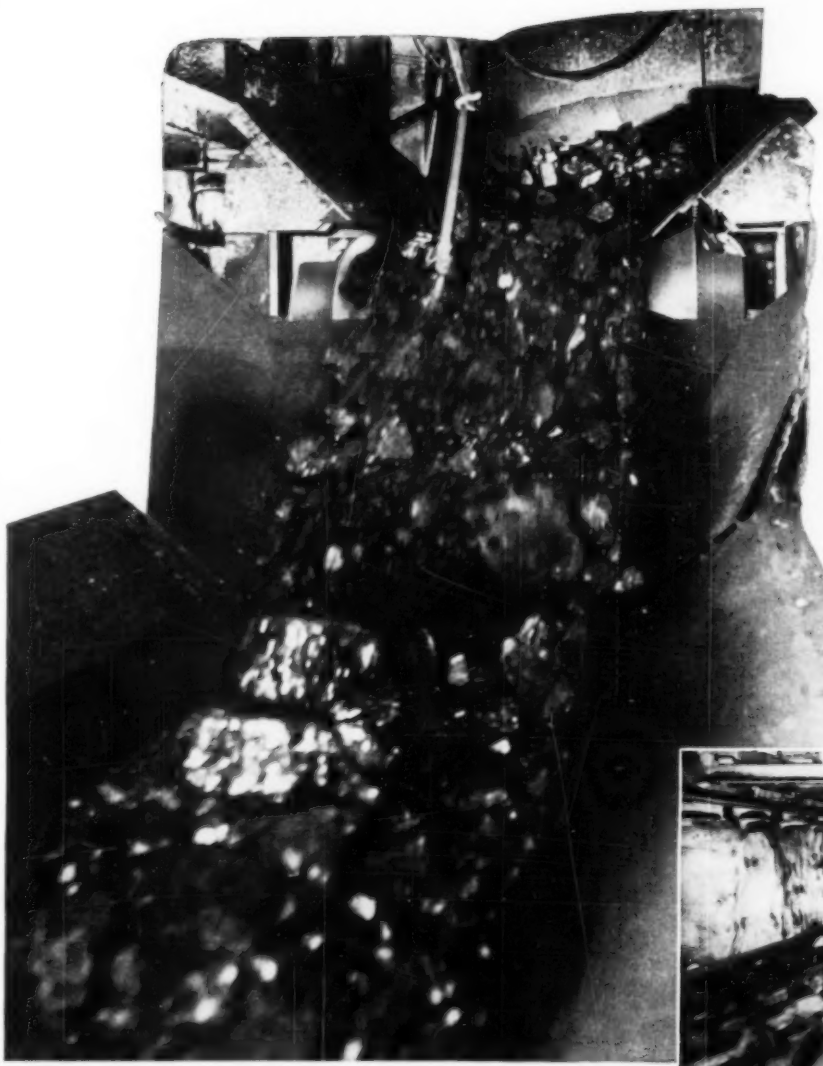
Phenol—Demand for phenol grew fast during World War II and plants to produce it still are being erected.

Resins—Apparently there is no ceiling on demand for resins of all sorts.

Synthetic detergents—Synthetic detergents soon will hold 50% of the market formerly held by natural soaps.

Naphthalene—In significance to coal, naphthalene is second only to benzene. Growth in demand is attributable mostly to expansion of the market for phthalic anhydride. But prices now are soft and,

World's most mechanized belt-equipped mine uses "U.S." Belts



VIEW OF INBY 42" U.S. GIANT secondary haulage belt discharging onto 48" transfer belt feeding 48" main haulage belt.

48" U. S. GIANT MAIN HAULAGE BELT. The crosswise flexibility of nylon construction enables belt to trough and train properly.

The No. 10 Mine of the Peabody Coal Co., Illinois, has a daily capacity of 12,000 tons. It's one of the most highly mechanized belt-equipped mines in the world.

In the pioneering and design of this great installation, United States Rubber Company engineers played an important part. "U. S." manufactured the main haulage belt, a 48" U. S. Giant® with nylon construction. It has handled peaks as high as 2400 tons per hour with no spillage. "U. S." also made the 48" transfer belt, as well as many of the 36" gathering conveyor belts, plus the two 42" secondary haulage belts. All in all, the total footage of "U. S." belt in this mine is more than 50,000 feet.

This Peabody Mine job is an example of Three-Way Engineering, a "U. S." technique which has proved outstandingly successful on thousands of materials handling jobs, large and small. In Three-way Engineering, "U. S." engineers work hand in hand with the designers of the conveyor system and the engineers of the mine. This is a positive, fool-proof way of obtaining the *right* belt construction for the particular job. Consult any of our 25 District Sales Offices, or write to address below.

U.S.RUBBER
SERVING THROUGH SCIENCE

"U.S." Research perfects it
"U.S." Production builds it
U.S. Industry depends on it

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

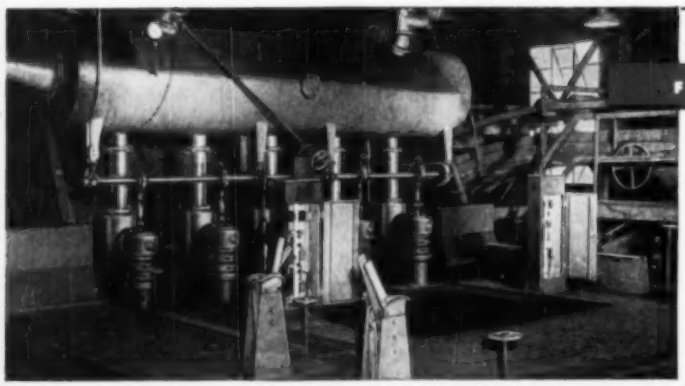
Hose • Belting • Expansion Joints • Rubber-to-metal Products • Oil Field Specialties • Plastic Pipe and Fittings • Grinding Wheels • Packings • Tapes
Molded and Extruded Rubber and Plastic Products • Protective Linings and Coatings • Conductive Rubber • Adhesives • Roll Coverings • Mats and Matting

Get cleaner, more uniform coal ... at greater capacities!

Pick the right LINK-BELT coal washer to match your coal seam and your markets

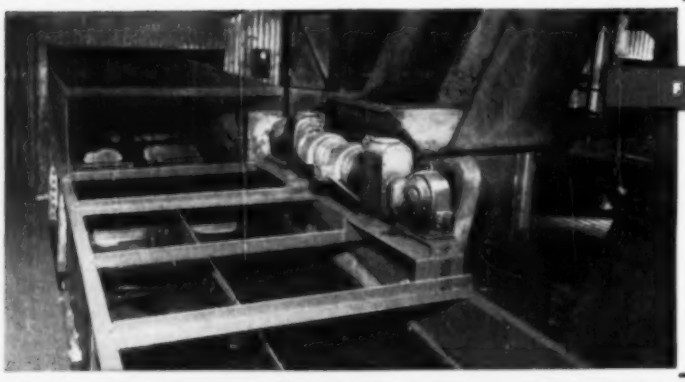
LINK-BELT manufactures three coal cleaners . . . and all three remove foreign matter from coal with top efficiency, effectively separate slate, rock, bone.

Each cleaner is designed for a different set of requirements . . . the result of over 60 years of Link-Belt specialization in coal preparation. Our engineers will be glad to work with you and your consultants . . . help you get the washing equipment that best meets your needs.



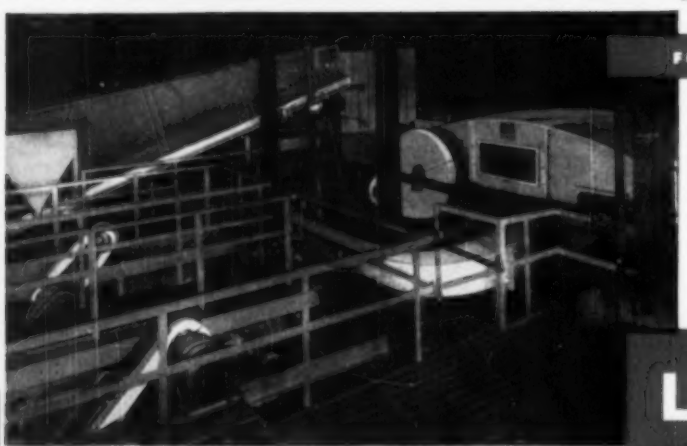
FOR CONTROLLED, ECONOMICAL WASHING

Air-Pulsated Washer — Extremely flexible for high-capacity cleaning of sized and unsized coal. Compressed air allows graduated pulsations in different compartments—immediate removal of heavy refuse . . . sharp separation of lighter refuse and bone from coal. One-man operated and easily adjustable while running. Suitable for a wide range of coal characteristics and sizes.



FOR LARGE VOLUME AT LOW COST

Combined Trough Separator and Air-Pulsated Washer — By placing a Link-Belt Trough Separator ahead of the Air-Pulsated Washer, a large additional capacity can be cleaned with little added investment or operating expense. Trough floats off a large part of the coal so clean that it requires no further treatment. Remaining coal and middlings then go to air-pulsated jig.



FOR DIFFICULT WASHING JOBS

Float-Sink Concentrator— Latest advance in coal cleaning—utilizes Heavy-Media separation process. Efficient for extremely high or low specific gravity separation . . . when a large percentage of coal is near the separating gravity . . . when amount of impurities in feed fluctuates or product must be quickly changed. Cleans larger sizes, reducing necessity for manual picking.

LINK-BELT

COAL PREPARATION and HANDLING EQUIPMENT

LINK-BELT COMPANY: Chicago 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntington 9, W. Va., Louisville 2, Denver 2, Kansas City 8, Mo., Cleveland 15, Indianapolis 6, Detroit 4, Birmingham 3, St. Louis 1, Seattle 4, Toronto 8, Scarboro, Branch Offices) 1388